

THE IRON AGE

New York, February 15, 1917

ESTABLISHED 1855

VOL. 99: No. 7

The Way to Win Trade in Russia

War Buying Methods—Lack of Trade
Balance — Warning Against Attempted
Exploitation—Germany to Be a Competitor

BY CAPT. D. L. HOUGH*

IN March, 1915, at the request of THE IRON AGE, a story was written on the subject of Russia. The composition of it was largely influenced by a desire to help the American manufacturer to understand conditions in Russia so that he would not chafe under the delays encountered in closing contracts after his offers had been recognized as acceptable, nor grow impatient because of changes in detail to which contracts are subject during the period of drafting.

Naturally it had to touch upon some of the general conditions met with in Russia and an attempt was made to set forth the difference in point of view between Russians and Americans. It pointed out how logical this difference is, in that the two countries have developed along very different lines, starting with very different traditions.

It was with the purpose of reconciling these, also, that the story was written and the message which it was chiefly desired to convey was an appeal for America to adapt itself to its customer rather than to attempt to reform its customer to America's point of view; the latter a thing quite impossible of accomplishment. The story has been translated and published in several Russian periodicals and as might be expected has received considerably more favorable comment from Russians than from Americans.

Russian Business Customs Slow to Change

Although written in March, 1915, it was based upon conditions as they seemed to exist in December, 1914, during which month the writer had left Russia for a short visit in America. Since then a great deal has happened. Russia has made tremendous purchases in America under forced conditions and perhaps a little against the grain, and, while the ways of doing business and the formalities in Russia have not been revolutionized and are quite likely to settle back into the old grooves after the war and so continue at least for the present generation, for "Changing Russia" will only become changed with the coming of a new generation, there

is no doubt but that Russia's point of view has to a certain extent been modified and the two countries have grown a little closer to each other.

Ever since the writer's return to Russia in the spring of 1915 followed by another visit to America in the autumn and particularly after returning here in January, 1916, there has been a strong desire to write a second story to treat of present conditions as modified by the engagements made by the Allies during the fall of 1915 and winter of 1916, and to add to this a study as to what may be expected after the war. It is possible that what is written may not conform to what many readers may want to believe, and what many writers on Russia in their enthusiasm have made themselves believe will be the conditions after the war.

The writer has had the advantage of contact with some of the leading people in Russia, as well as Americans and Russians who have visited the other country. He has been in England and believes that he sees the situation from a more or less composite point of view and with a considerable business experience in America and five

years in Russia approaches the subject from what he believes is a rational, rather than an over enthusiastic, point of view.

War Buying Done by Special Commissions

In THE IRON AGE story of March 25, 1915, the confusion brought about by the activities of self-appointed brokers of both nationalities in the duplication of inquiries, and the multiplication of offers with their duplicated and triplicated and multiplied commissions was pointed out. Shortly after returning here in April, 1915, the writer was asked to write a memorandum for a certain high commission, and in it, although himself engaged in representing American manufacturers in Russia, he urged upon this high commission the advisability of sending fully-empowered representatives to America to purchase direct from the manufacturer wherever this was possible. There had been several special commissions already established in America but confusion in authority had developed and perhaps one may say conflict of interest, hence it was urged that a high commission be formed that should control all purchases that could be made according

The Special Message of
the Accompanying Article
Is That Russian-
American Business Expansion
Is Not Without
Its Drawbacks.

*The author is the American member of a firm of Russian contractors and has been a resident in that country for several years. Previously he headed the United Engineering & Contracting Company, New York, which constructed some of the tunnels at New York for the Pennsylvania Railroad.

to sample specifications, if not to fixed specifications.

It may not be necessary to say it, but it is said to avoid misunderstanding, that the memorandum referred to above was, of course, in no way the controlling element in the co-ordination of the purchasing commissions or rather the co-ordination of Russian commissions in America, but it certainly was read in high places and had some effect in reassuring those who believed in the policy.

This, of course, was a matter that has to do only with war conditions, and while it is probable that the Government will continue to have representatives in America after the war, it is possible that these will be confined to their naval, military and commercial attachés.

One type of purchasing naturally cannot be done through commission methods, namely, that for railway equipment and other engineering requirements such as the motive power and equipment of vessels, where the manufacturer must send his representative to treat with the senior officer of the Government departments. The duties of these officials is such that they cannot be spared from the coun-

What American Capital Can Do in Russia

Build complete manufacturing plants to handle materials from the raw state to the finished product, especially rail mills, locomotive and car-building shops, wood-working machinery factories and machine-tool plants.

Supply permanent engineering staffs and skilled labor.

Develop Russian resources by constructing railroads, storage warehouses, refrigerating plants, grain elevators, etc., build highways, public utility plants, etc.

try and yet, having the responsibility for the continued operation of what they purchase, must study and be fully informed upon the details of design and construction before placing orders.

Criticism of Present Methods

Commission buying is, of course, open to criticism, but it has been pretty well proven that most of the criticism has been unfair where directed against direct Government commissions and has originated largely from disappointed salesmen and self-appointed brokers, scalpers of a profit.

The criticism made of certain American banks buying for foreign Governments is also unfounded, but in this case, of course, there is the added opportunity for criticism that lies in the human impulse to favor an allied concern.

There has been some criticism in Russia of the agreement made with England which permitted England to supervise purchases and required the consent of England before Russia could purchase. On the other hand, it is but natural that when one wants to borrow one must accept the conditions imposed by the party to the loan that gives the accommodation. Theoretically the plan was logical, and perhaps it has avoided abuses that might have crept into purchases had other conditions existed. It has had its serious drawbacks, however, particularly at a time when prices were going up so rapidly. Frequently the time consumed in applying for a credit, the study of the situation by the English committee and the approval and formal granting of consent has occupied a period of time during which prices have gone up as much as 20 per cent. Where

the necessity for the purchase was obvious it would have been much better to have granted the consent upon the advice of some local representative, as for instance the British military or naval attaché, without the long delay; but here again there would naturally be present an excusable disinclination on the part of an individual agent to lay himself open to the suspicion of being influenced and no doubt the individual is much better pleased to have the matter handled by a commission.

European Prejudice Against Buying in America to Persist

The delay encountered, and any annoyance that may have been felt has been confined to purchases made in America. Where what Russia wanted to buy could be purchased in England or in one of the other Allied countries whose credit would thus be improved and in its way lighten the load upon England, there has been no delay. America cannot complain because of this disinclination upon the part of England to see the Allies spending money in America, for it is but natural. It is also a condition that confronts us not only at the present time but that will continue to confront us in our securing of business after the war.

In what is said above no criticism is intended. It is more or less an unavoidable condition, for as England has had to raise the money and pledge her own credit for the loans, she not only has the right but must keep herself straight with her taxpayers who in the end may have to bear the burden. This is, of course, wholly improbable, as while all the belligerent countries are developing a terrifying indebtedness, the debt per capita and the debt in percentage to resources is much less in the case of Russia than in that of any other country engaged in the war, and she will be the first to recover financially. England must also protect herself against the contraction of unwise indebtedness or the demoralization of credit by the borrowing of money from those too weak to carry the load or whose interests might be inimical.

In many cases great advantage has doubtlessly resulted through the system followed. On the other hand, there have been some misfortunes. For instance, had a certain order for small arms and ammunition been placed in August of 1915 these would now be being delivered, and while for the moment their need is not evident, conditions might have been such that the obstruction met with in placing the order might have led to misfortune, and had it been possible to place orders for locomotives and cars without delay much-needed equipment would now be in service.

Turning to the chief purpose of this story, namely, to discuss post-bellum conditions: Many articles have been written, many speeches made and many conferences held in which it has been proposed that after the war nothing whatever be purchased from Germany.

It would seem that one might view this a little more rationally. With Germany conquered by isolation, perhaps by force of arms, but most likely by a revulsion of feeling within the country itself, the thing that the Allies have been fighting, namely, German militarism, will be wiped out.

German Competition to Be Keen

The industrious, peace-loving German working classes upon whom the war has been as severe as it has upon the Allies will have the sympathy of the world and the new Governmental group that negotiates peace must perforce find some common ground of sympathy with the other countries. The Allied countries of the West must communicate with those

of the East by passing across German territory, making use of Germany's reorganized transportation facilities. They must perforce be brought in contact with Germans, with whom will have been arranged by the peace treaty some basis of not unfriendly intercourse. Germany must buy food stuffs abroad, and in order to preserve her balance of trade she is certainly going to sell, so that Germany must ultimately be met as a competitor in cost of manufacture and of delivery. One must meet as well the natural and wholly appropriate preference of purchasers to buy from those countries that have helped them to overcome their enemy in common rather than from a country that has seemed to have, whether it has or not, taken advantage of their difficulties and necessities by putting prices at an unpleasantly high level, and forcing them to pay upon terms that, while quite excusable under the circumstances, were nevertheless objectionable.

What Russia Will Buy from America

Personally the writer does not look upon the volume of trade that is to be developed between America and Russia with tremendous optimism. Russia will buy from America:

First: Those things which she can either get only, or can get best, from America, just as she did before the war. Among this merchandise and those manufactures is first of all cotton. While cotton is being produced in Russia in an ever-increasing volume, it has been and will continue to be the largest import from America, and unless we are prepared to extend the reasonable credits that Russia asks, this commodity will again be imported into Russia through some other country. This will not necessarily be Germany, because if a duty discriminating against Germany is actually imposed, it will affect most merchandise of this sort and may lead to the import thereof through England, which will probably be in the best position to extend credit. America can and should import direct. The only hindrance will be the refusal to extend credit.

The most important item among the manufactures will be agricultural machinery, the makers of this machinery having already organized their selling on the basis of appropriate credits. "Awakening Russia" is arousing more rapidly in this direction than in any other and large imports of agricultural machinery will still be required although not only foreign but Russian companies as well are extending their plants for the manufacture of these implements in Russia very rapidly. Next to this will be road-making machinery. The import of these machines had just gotten under way when war was declared.

In scythes alone among the smaller implements a tremendous business can be done if America will furnish the type of scythe that Russia is accustomed to using. This is a very thin angle section. The stiffness is obtained by the vertical leg. Naturally they sharpen away very rapidly but they sharpen easily, and their cheapness is one of their great selling points. The same is true of shovels, picks, rakes, hoes, etc.

Second: The sorts of manufactures that Germany controlled. These consisted of all sorts of small household implements, kitchen utensils, hardware of every type, and all those things that come under the head of novelties. The only way to get into the hardware and novelty trade, however, is to open up shops, and this leads to the statement that the introduction of five and ten-cent stores all over Russia would be one of the greatest of money makers, and, in the larger cities, the foundation of modern department stores. There are such in Rus-

sia, but they lack the organization that is found in American enterprises of this character.

Third: The machinery and equipment that goes into the manufacture of all sorts of wearing apparel and the production of food stuffs.

Lack of Balance of Trade Serious

One of the conditions that must be given consideration among the hindrances to Americans obtaining a large trade in Russia is the fact that we need so little in America that Russia can best furnish. We do not need her agricultural products and she has not enough nor has yet developed her mines to an extent permitting export. There is no balance of trade and it would seem that in order to secure reciprocation a three-cornered "circuit" would have to be closed. Russia may sell her grain to Germany, France and England, we may buy from these countries, and Russia may buy from us.

The great thing that Germany has taught the Allies in this war is that all countries must make themselves as nearly as possible self-supporting. Russia's great handicap in the present war has been

What Russia Will Buy in America

Merchandise and manufactures which she got here before the war, such as, first of all, cotton goods.

Agricultural, road-making and similar equipment.

Small implements, such as scythes, farming tools, etc.

Special machinery for the manufacture of clothing, foodstuffs and other staple articles.

Manufactures formerly bought from Germany, including household utensils, hardware and novelties.

the absence of manufacturing plants within her own territory that could be quickly turned into munitions makers, and she is not going to be caught this way again.

Genuine Help the Way to Win Business

Further than this, Russia in its awakening is going to develop its own resources. There is no question but that she possesses large bodies of ore of every type awaiting development, and these in turn must be used to manufacture what she wants. It is in this way that America may perhaps best help Russia, for the rendering of help to her is the only ground upon which Americans may expect to secure the privilege of helping themselves in Russia.

The great opportunity in Russia as suggested lies in the building of plants within the country that will manufacture what her people want. This is also in keeping with one of the strongest national principles, namely, to purchase at home whatever may be produced at home, and at the same time save the costs of transportation and add to the general prosperity of the country.

Plant Installations Must Be Complete

There seems little more that may be said on this subject, it is so self-evident. The writer naturally feels the strongest appeal from the need for railroad equipment. Rail mills and locomotive and car plants are the greatest need. There are several plants in America that have a greater output than all of the Russian plants put together in the manufacture of both locomotives and cars, and this is also true in the case of rail mills. In building plants in Russia manufacturers must start with

the ore and the coal, as there is not enough steel and iron production to take care of the manufacturing plants that now exist.

In everything that has to do with woodwork Russia can take care of herself, except that she needs tremendous amounts of wood-working machinery, and this emphasizes the requirement for plants to make the machinery for the equipment of manufacturing plants. There are practically no machine tool works in Russia.

Labor and Engineering Skill in Russia

In this connection we must consider the question of skilled workmen. Russia has all the common labor that is needed and will still have it in spite of the tremendous wastage of the present war, and there is no question as to the ability of the Russian workman to accept training.

The Russian engineer and all those theoretically educated are trained perhaps to a little greater, perhaps to too great, a refinement than those of any other country, but they lack practical experience. This may or may not be a circumstance brought about by the fact that Russia has no middle class. The rich are very rich, and when their attention is given to education they get the best and go the farthest. Her poor are very poor, although of a poorness that perhaps does not appreciate how poor it is, and is not, therefore, as unhappy as one might think, and the poor have little or no opportunity for that little education that fits them to become skillful or gives them the bent toward it.

For the next few years a considerable amount of skilled labor will have to be imported. This skilled labor must get out of its mind the idea that it is to be sent over here for a few years and then take its earnings back home to spend, and this is equally true of the capital invested. It must expect its earnings in rubles and must invest its rubles in Russia.

The skilled labor that comes here must come in a spirit akin to that of colonization, and the workmen bringing their families and settling in small communities in manufacturing towns will be just as happy and can create for themselves as much of entertainment as was had in their own country, and may feel sure that they are doing a mighty good thing for their children and grandchildren.

Feasible Openings for American Enterprise

In discussing the subject of the development of properties by American enterprise and American capital it is not necessary to take space to go into the tremendous opportunities of this character that Russia offers, for these have been discussed until they are threadbare. American engineers, operators and financiers must be convinced by this time that the opportunities are tremendous.

First among these comes the opening up of the country by railroads that are so much needed, and that will give facilities for the distribution of its products and manufactures. Foremost among these is the proposed Southern Siberian and its many branch lines, all of which will make business for themselves.

In connection with railroad extension comes the organization of the storage and the transportation of grain, and the storage and transportation of produce that requires refrigeration.

A thing that is not as much discussed but impresses the engineer who has lived here is the development of a network of usable roads that will feed these railroads, and with motor transportation may help to offset the lack of railroads as well as supplement them when built.

The development of mining properties knits itself up with the construction of plants heretofore discussed and one must not lose sight of the necessity that is fast increasing for the improvement of public utilities in the municipalities.

A Warning Against Exploitation

But in contemplating the possibility of entering into these activities, Americans should remember that Russia is not a country like South America or Central America in respect to the United States, or South Africa and India in respect to England, a country where one may go and make a fortune, then return home to build a fine place in Massachusetts or elsewhere to enjoy the fruits of one's efforts. Russia is not going to stand for this. She wants her country developed for the sake of Russia, and she wants the fruits of the effort invested within her own country for the further extension of these same developments. In other words, she looks askance upon the possibility of the country being exploited for the purpose of increasing the surpluses of financial and construction companies in other countries, and is perfectly willing that the increases in her own wealth shall be risked along with the capital invested by foreigners, but she wants that foreign capital invested in Russia.

Not long ago the president of a rather important public-utilities development organization wrote a letter stating that he was not so much interested in construction propositions in Russia as he was in taking up reorganizations in which a good commission could be made. In the first place, there are not the industries in Russia to be reorganized, and if there were such they would, and such as there are do, find plenty of capital and plenty of talent to bring about reorganizations and consolidations and thus keep the commissions right here in Russia.

Americans must also consider the restrictions in Russia that are not met with at home.

Political Conditions in Russia

Here again we must point out that Russia is not a South or Central America nor Africa nor India. While Russia is a much older country than the United States, for very good reasons, for example, its great extent and its greater extensions that have been going on even up to the present time, it has been possible to give but little attention to co-ordinating a modern type of government. This co-ordination has just begun, and is developing now at a time when other countries are correcting the co-ordinations made at an earlier time to meet with modern ideas that may be called liberal if we accept liberalism in its best sense.

It has been, and it is, more easy, therefore, for Russia to adopt and put into use modern ideas of government control. It may perhaps be said that the human tools of government in the past have been working under conditions that have given them opportunities to abuse their power, but the better type and more enlightened men that are now interesting themselves in this sort of thing in Russia, are giving and are going to give the best results. Russia does not need trust legislation, for trusts are now impossible, and it is for this reason perhaps that capital can be more secure in its investment in that it knows at the time of undertaking its enterprises just what restrictions it is to meet. There is no case on record where the rights of a company once granted have ever been interfered with so long as they kept within the limits of the liberties given them in their incorporation.

It is perhaps because of this modern policy that Russia will more readily grant support to specific

effort than it will to large combinations of capital due to its fear lest these combinations grow so strong as to become a menace in that they might exert a control that Russia prefers should be vested in governmental hands.

To sum up, therefore, the attitude of Russia toward foreign enterprise and capital it might be said that Russia invites and will welcome any organization that can do any particular thing particularly well, to come and undertake its enterprises there with the promise of most helpful and sincere support. Russia will see that appropriate profits are granted for the capital and effort expended. It is to be believed that when she can turn her attention from this most engrossing war to the activities of peace, that she will give her attention to eliminating much of the delay now encountered in official departments and reorganize her governmental procedure according to the requirements of modern business methods.

TREATING HIGH-SPEED STEEL*

High and Low Tungsten Compared—Importance of Temperature Control

BY A. E. BELLIS AND T. W. HARDY

The problem of heat treating high-speed steel becomes more and more important as the design of cutters becomes more and more complicated in increasing the efficiency of mechanical operations. Hundreds of dollars are spent in the design and manufacture of milling cutters of special form for rapid production of duplicate or interchangeable parts, and then, as the heat treatment is faulty on the one hand, or scientifically executed on the other, the tool fails after a few operations, or its efficiency is greatly increased. The practical operation of giving these complicated tools the right temperature necessary to bring out the best cutting qualities, and at the same time bring the tool out "clean," is a difficult one and calls for no small amount of skill.

In order to be on the safe side the average tool hardener uses a temperature much too low to give the best results with the high-speed steel he uses. In the case of cutters, which are finished to a given diameter before hardening, it is impossible to grind the tool after hardening, so that it is essential that the surface be protected from oxidizing or decarbonizing. It is the aim of this paper to describe some experiments on hardening high-speed steel, in which metallographic means were used to determine the correct hardening temperatures.

The analyses for carbon, tungsten, chromium and vanadium of each steel used in the hardening experiments are given in the accompanying table. Six speci-

Analyses of High-Speed Steels Used in Hardening Tests

Steel	Carbon, Per Cent	Tungsten, Per Cent	Chromium, Per Cent	Vanadium, Per Cent
A.....	0.58	17.4	3.11	1.14
B.....	0.60	13.3	3.32	3.58
C.....	0.53	13.0	4.69	2.45
D.....	0.75	17.7	3.30	0.85
E.....	0.60	16.5	3.55	0.70

mens from the same bar of each kind of steel were hardened from different temperatures, and photomicrographs made. Six samples were taken from the same bar in the annealed condition regularly furnished the tool maker. Photographs were made of the longitudinal section, care being taken to grind off the outer surface. The specimens, $\frac{1}{4}$ in. square, were first preheated at 1500 deg. Fahr., and then quickly placed in the high-speed furnace already heated to the desired temperature, left at this temperature for 1 min. and quenched in oil. The temperature was controlled by a standard pyrometer, consisting of a rare-metal couple

and potentiometer. An optical pyrometer of the Holborn-Kurlbaum type gave excellent checks with the standard pyrometer, and proved more convenient and durable. A precision of 10 deg. Fahr. was attained throughout. The polished specimens were etched for 15 min. in 4 per cent. alcoholic solution of nitric acid, and photographed under a magnification of 1000 diameters (750 diameters as reproduced).

(The original paper contains 30 photomicrographs showing the results of the treatment in each case.)

Excess Carbide Steels Most Efficient

In general, the steels that show some excess carbide even at the maximum hardening heat are the most efficient. These, as a rule, are the steels with high tungsten content; they harden from a higher temperature and over a wider range than the lower-tungsten steels. For this reason they do not require as careful treatment and are, therefore, more popular than the lower-tungsten steels. The steels with lower tungsten and higher vanadium give better results when hardened at the lower temperatures than do the higher-tungsten steels when these are hardened at the same low temperatures, but the comparison is not so advantageous to the lower-tungsten steels when the steel with higher tungsten is given the proper hardening heat.

The importance of carefully controlling the hardening temperature, and of varying it for the particular steel used, cannot be overemphasized. The custom of using one "high-speed temperature" for all tools is very poor practice, for, as shown by the photomicrographs, the best structure may be obtained with one steel at a temperature which will "burn" another, or not harden a third. Thus 2300 deg. Fahr. or over is necessary to give A or E a good structure, but this temperature gives a coarse grain in the other steels, or "burns" them. Again, a temperature as low as 2150 deg. Fahr. can satisfactorily harden B or D, but tools made of other steels would not stand up if hardened at this temperature. More extreme examples could have been shown, but the samples chosen are typical of the most widely used brands of such steel.

The average hardener rarely obtains the best result from his steel. The reason for this is, especially in the cases of tools that cannot be ground after hardening, that oxidation becomes a serious problem at higher temperatures. The use of a barium chloride bath to eliminate this difficulty has the disadvantage that the surface of the tool becomes decarbonized. A method that has proven satisfactory is to place the tools after preheating in the reducing atmosphere of a carbon resistance electric furnace already heated to the required temperature. The very short time necessary to get the tool to the temperature of the furnace eliminates deleterious surface effects. Pack hardening often gives good results but, owing to the great affinity of iron for carbon at high temperatures, care must be taken to reduce this carbonizing action to a minimum. This may be done by selecting a packing material of little or no carbonizing power, and by cutting down the time during which the metal is in contact with the packing material.

The increased efficiency and cutting power of tools that have received the proper heat treatment is out of all proportion to the time given to the study of the particular steel involved, and to the care exercised.

Instead of military conscription, so prominent before the public in connection with preparedness, a conscription of the whole youthful population to form an army "enlisted against nature," is suggested by Dr. Ira N. Hollis, president American Society of Mechanical Engineers. In an address Jan. 2 before the Cleveland Chamber of Commerce he said such an army could, for instance, supply the labor for building the Lincoln Highway across the continent and there might also be a Washington Highway from Maine to Texas, passing through the mountains of Kentucky and Tennessee. All the discipline of the army, he urged, can be found in the working party with the pick and shovel taking the place of the rifle.

*From a paper to be presented at the coming February meeting of the American Institute of Mining Engineers in New York. Mr. Hardy is metallurgist, Nova Scotia Steel & Coal Company, New Glasgow, N. S.

Making the Executive More Efficient*

Use of Charts on the "Exception Principle"
to Save Manager's Time and, for Example,
to Develop Personal Contacts with Employees

BY FRANK B. GILBRETH

WE have stated many times that the greatest waste in the world today is from unnecessary, inefficient and ill-directed motions. Many people think that this statement refers only to such activities as those of the bricklayer, the shopworker and other kinds of mechanics and manual workers. It does refer to them, but also to managers and all other executives.

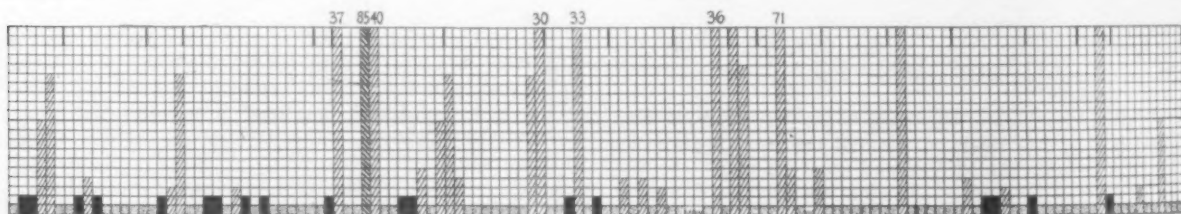
To one trained in the sciences of management and motion study, nothing is more ridiculous and pitiful than the average executive when he tries to enforce new motion methods on those farthest below him on the industrial scale, while he at the same time commits nearly all the motion wastes in his own personal work. The personal work of the executive should consist, as much as possible, of making decisions, and, as little as possible, of making motions. General recognition of this fact has resulted in the common practice of assigning to the executive one or more secretaries, or clerks, to relieve him of certain parts of his work which involve more motions and less important decisions than that part of the work retained by the executive.

What a Chart Should Show

Some executives are furnished with charts which show by means of comparable curves the increase or diminution in output, cost, overhead expense and, in comparatively rare instances, even in results as compared with budgets. As compared with an organization which has no cost system, such a recapitulation,

provide himself with charts which will tell him how much time has elapsed between the completion of the output and the recording of it and its attending costs. The by-products of a properly operated chart system are even more valuable than its direct product. We find that the psychological effect of the variable "promptness" itself makes the curves representing outputs and costs fall more nearly in the proximity of the locations prophesied on the charts. Such charts give the executive and his colleagues accurate measured information of deviations from class in all departments. The motions that an executive would expend in getting information by such old methods as, for example, walking through the works to see with his unreliable eyes conditions which are not typical, partly owing to his presence, bring results of little value compared with the results that can be obtained by the same amount of time and motions concentrated on those facts and conditions which cause the great fluctuations from the desired output.

While this fact is generally recognized, the number of installations of chart departments throughout the country is increasing with surprising slowness. Even in those organizations where there is a satisfactory cost system supplemented by charts with curves, showing results as compared with expected conditions and ideals, the executive too often finds himself flooded with charts. Then, being human, he postpones studying them. As a result, many benefits which come from promptly making records of outputs and costs are lost



As a simple illustration of a chart used on the exception principle, the above has been obtained from Mr. Gilbreth. It may, for example, show the promptness of performance of an information bureau of a factory in charge, say, of trade publications, estimates of work under consideration and records of design sketches. Each horizontal space may represent a specific request for information and each vertical space the time required to supply it. Colors may be used to indicate notable time differences. The point of the exception principle is that the chart shows at a glance when it

took too long for a definite inquiry. Then it may be the duty of one individual to ascertain why, for instance, as long as 10 min. was necessary and another when the time is say over 20 min. In the so-called three-position plan of management (in which the occupant of any particular job gets supervision from the one promoted from it and serves as a tutor to one in line to fill it), the result is an effort to keep the time intervals within the safety zone so to speak, so that No. 1 of the three-position plan is not likely to be demoted to improve the service.

even in the form of an "expenditure system," and such cost statements and graphical charts are a great step forward. No cost system nor chart system, however, can be considered really satisfactory unless it determines and shows:

1. What the quantities of individual outputs should be (prophecies of outputs).
2. Prompt records of individual outputs.
3. What the costs should be (prophecies of costs).
4. Prompt records of costs.
5. Causes of fluctuations and deviations of outputs and costs from prophesied outputs and costs.

The executive may have much to do with originally determining items 1 and 3; but after the computations of 1 and 3 have been completed, he can best attack the problem of enforcing items 2 and 4 and, also, of determining 5 by the use of graphical charts. He should

by his delayed action. It is here that the "control on the exception principle" plays the important part.

It is obvious that the foreman, or other functionary, should see promptly all the records of output in his particular department. In most cases he will be able to handle his duties still more satisfactorily if he, also, sees the costs of the output of his department. The time of the over-foreman, however, who may have several foremen and departments under him, is too valuable to have him, also, examine with care all the records of all the men under him. Consequently, he should be furnished with information in concise form, in order that as little as possible of his time may be taken. This has often been furnished him in the form of averages.

The Use of Averages

Ordinary averages have their use. Progressive averages are, however, more valuable, because they

*From a paper read before the American Society of Mechanical Engineers, Dec. 6, 1916. The author is a consulting engineer, Providence, R. I.

show the trend of progress and efficiency. It sometimes pays to make ordinary averages, but the value of examining such ordinary averages is slight compared with the benefits which result from concentrating the same amount of motions and attention on those individual cases that brought the average away from the ideal. A case of "bad average" may be the excuse for putting the foreman "on the carpet," but the results of this do not compare with the good results that are derived from having the over-foreman investigate promptly the case or cases that spoiled the average. Moreover, the decisions of the over-foreman can be made more quickly, for he has the information which comes from locating the trouble accurately. Instead of "tearing out" the foreman or the workman, he will find, from the causes marked on the chart, that the worker's low output is due to lack of the proper tools, to his not having been furnished with tools in standard conditions, to the routing system having failed to give him proper materials in the right quantities, in the right sequence and at the right time, to something which has gone wrong with the equipment or surrounding conditions; to the man's not having been properly instructed; to there having been an unwise selection of the man or the machine, or both, for the particular job.

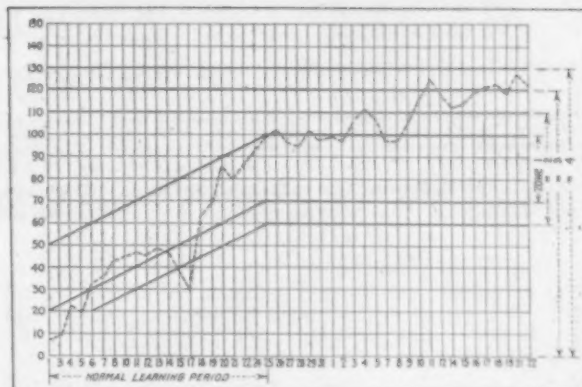
The worker, also, is more careful not to do anything which is not expected of him, because he knows that the exception will surely be noticed by the executives higher up and will interfere with his chances for promotion or transfer to work of a more desirable kind. Knowing that they will be investigated properly will create a tendency on the part of the foreman and the workers to cooperate with others whose work affects theirs, or who in turn may be investigated. This co-operation becomes general and sooner or later becomes a habit.

The Exception Principle.

Now the time of the executive next above the over-foreman is still more valuable than that of the over-foreman, and so on up to and including the managing director or president. No executive should make a routine motion of handling, turning over or examining charts containing data, either normal or with considerable deviation from class, where the causes of the deviation can be handled properly by those in lower executive positions. The exclusion of such cases can be obtained by having the executives determine zones on the charts, it being understood that as long as the points fall within the zone, he is not to see the charts unless he specially requests to see them. He is, however, to have sent to him any chart having a point that falls outside the excluded zone.

An executive of any class will find it beneficial to see exceptionally large cases of deviation on the desired side of the line so that he can recognize and appreciate and take a personal interest in cases of unusual efficiency. It is through such cases that he gets in touch with unusually good methods. This is a check on the Time Study Man's work. It also gives the executive valuable opportunities for proper managerial decisions in cases of the selection of candidates for promotion under the "three position plan" of organization building, in which every man is not only attending to his present job, but is training himself for the next higher job and keeping a watchful eye on his successor in his previous job. The curves showing progressive averages of departments may be examined at times farther and farther apart, these intervals to be determined in each particular case by the favorable or unfavorable comparison of records of such averages showing outputs and costs with the prophesied outputs and costs. The executive is thus relieved later of work which is necessary at first but which is not necessary when the particular case is running satisfactorily.

It is impossible to prophesy with accuracy what the amounts of outputs and costs should be without motion study and time study. But once these have been made and the actual outputs and actual costs approximate those prophesied, the high executives should devote very little time indeed to inspecting this class of charts. Instead they should spend their time on other work, other departments and more important things where their supervision will bring more valuable results.



Another example of the exception principle chart may cover the output of a single worker, including his learning period. Zones are established so that points of performance falling below or above certain limits come automatically by that fact to the attention of certain individuals. The lower the record or the higher the record the higher in the industrial management scale will be the individual who must inquire into the conditions. The results may indicate poor instruction or incompetency in foremanship or they may bring the executive into personal contact with the worker in the matter of commendation for unusually high performance.

It will be seen that these "Output, Cost and Causes Charts" with Exclusion Zones enable the executive to eliminate the motions required for general oversight and inspection until a place on a chart is brought to his attention where he can actually help those below him and furnish them with better instructions for handling their work more efficiently, or for making such changes as will naturally result in promotion or the selection or shifting of individuals better fitted to do work elsewhere. The possibilities of relieving the executive of unnecessary motions and of enabling him to be more efficient in his own work are not exceeded in the case of any manual worker.

Tata Iron & Steel Earnings

The Tata Iron & Steel Company, Ltd., Sakchi, India, made a net profit for the year ended June 30, 1916, of \$2,215,637.75. After appropriations for depreciation, repairs, renewals, reserve fund, etc., there remained \$1,296,617.65. Out of this a dividend of 6 per cent was declared on the 50,000 shares of preferred stock of 150 rupees par value; of 8 per cent on the 200,000 shares of common stock of 75 rupees par value, and of 25 per cent on 22,500 shares of so-called deferred shares of 30 rupees par value. It is understood further than an additional dividend of 7 per cent was paid to common stockholders, who thus received in all 15 per cent, or \$729,900, and of 46 rupees 10 annas and 8 pies per share, or about 155½ per cent to holders of deferred shares, who thus received a total of slightly over 180½ per cent, or \$395,362.50. After dividend deductions there was \$25,375 of undivided profits carried over to the present year's accounts.

Three production records of the Bethlehem Steel Company's works, announces President E. G. Grace, were broken last month. In mill 2 the 12-in. department produced 2963 tons, against 2767 tons, the best previous record, and the 10-in. department, 1385 tons, against 1133 tons. The iron foundry made 7031.36 tons of castings, against 6854 tons, the previous high record.

The Union Iron Works, Spokane, Wash., has received a contract for furnishing 300,000 lb. of machinery to the Orogrande Gold Mining Company, Stites, Idaho. The equipment will include two tube mills, complete outfit for a cyanide plant, four agitators, etc. The old plant of the company is to be overhauled and remodeled.

WELDLESS STEEL TIRES*

New and Old Process of Making Tires for Locomotive and Car Wheels

STEEL for tires was originally made in the crucible. The ordinary practice was to cast individual ingots, poured from the top into cast-iron molds of great variety of shapes. The popular mold was pear-shaped, or the frustum of a cone with the small end up. This was for the purpose of reducing the area affected by shrinkage. The ingots were subsequently flattened under a steam hammer, a small hole punched in the resultant slab, or disk. This hole was enlarged by hanging the punched disk on the horn, or beak, of the anvil, or lower die, on which it was rotated while the hammer struck successive blows on the outer edge. During this operation, the flange, where one was required, was roughly shaped. After this operation, the "beaked bloom," as it was called in England, was rolled to required dimensions in the tire mill.

Some of these early tire mills seem to have been horizontal two-high bar mills altered by extending the rolls through the housing farthest from the engine and hanging the tire on this extension. Many manufacturers followed this idea in designing new tire mills, the rolls being horizontal and the tire in the air while rolling.

The later practice has been the casting of long ingots of open-hearth steel. Each ingot is sliced cold into as many blocks as necessary and the top portion, enough to eliminate all danger from segregation and pipe, discarded. The slicing operation is stopped before the center of the ingot is reached, the remaining core being broken, so that the fracture at the center of the ingot can be examined.

In a tire works with modern equipment, the sliced block is very slowly heated in a continuous furnace, upset, punched, beaked (when necessary) and rolled, without being allowed to become cold at any intermediate stage. The various operations are performed at a press, or hammers, and two or three mills, the partly finished bloom being transferred from one to the other with no appreciable loss of heat during the transfer. The results of this method are eminently satisfactory, the metal being continuously worked from the high forging heat to the proper temperature at which it should be laid down to cool.

The old tire mills were designed for tires of comparatively small diameter and thin sections and usually consisted of only four rolls, two of which might be called working rolls and two guide rolls. One of these working rolls, the main roll, contained a single box pass, turned to fit the contour of the outside of the tire, the contour including the tread and flange with the front and back faces contiguous thereto. The other working roll, the pressure roll, was turned to coincide with the bore of the tire, being of exact width to enter the box pass in the main roll. One of these working rolls, usually the main roll, was rotated, its bearings remaining stationary; the other working roll was rotated by friction between its periphery and the inside of the bloom as the latter rotated by friction with the main roll. The bearings supporting the pressure roll were carried on a slide, which, operated by hydraulic or screw power, advanced as required toward the main roll, thus reducing the opening between the two and the cross-section of the bloom or tire being rolled. The two guide rolls merely served to preserve the circularity of the tire by bearing against two points on its circumference equidistant from the main roll. They were driven only by friction between the tire and themselves and were carried back and forth on slides or carriages operated by screw or hydraulic power.

The more modern mills have four guide rolls touching the tire at four instead of at two points. They have a pressure roll similar to that described above except that its face is longer than the width of the bloom or tire being rolled. They have a main roll containing a

very shallow box pass, not covering or overlapping the front and back faces of the tire, and, in addition, have two horizontal rolls, one driven by power, the other driven by friction. The latter is raised and lowered by screw or hydraulic power. With this universal type of mill, pressure is brought upon the section of the tire from all four sides. The quality as well as the quantity of work turned out shows much improvement.

Many changes, great though gradual, have occurred in the demands made by consumers upon tire manufacturers. Most of these are for the better. The standardization of sections and diameters insures more satisfactory deliveries and eliminates many causes of error. The "mileage guarantee," usual in the early days, is now seldom demanded and still more seldom granted. Railroad operating men appreciate that there are important factors affecting the hardships inflicted upon locomotive driving tires which can seldom be calculated, more seldom foreseen and never observed or recorded. Safety can be demanded and secured. Wearing qualities would better be considered among the general results. Locomotive driving tires have sometimes shown abnormal wearing qualities, being apparently indestructible, and yet the efficiency of the locomotive shod with them has been reduced to a minimum by loss of tractive power.

The Standard Pipe Receivership

Announcement is made by General Manager William E. Dodds, of the Standard Cast Iron Pipe & Foundry Company, Bristol, Pa., that the receivership imposed Feb. 3 means the reorganization of the company along the lines of more capital and a wider range of output. Robert Wetherill, of Chester, as mentioned in last week's issue, is the receiver. His long experience in the iron business should enable him to handle the company's interests wisely. Mr. Dodds is quoted as saying that the growth of the company's business has made more capital necessary and that the receivership was arranged pending the raising of needed funds. He added: "I am hopeful that a reorganization will prove advantageous to the Standard Company, its employees and the community." The company is one of the town's most important industries and its payroll has been more than \$40,000 a month. It built the suburb of North Bristol.

'American Steel Foundries' Year

The American Steel Foundries reports earnings for the year ended December 31, 1916, as follows, compared with the previous year:

	1916	1915
Net earnings*	\$4,102,823	\$313,242
Other income	122,987	189,523
Total	4,225,810	502,765
Interest, etc.	257,240	472,200
Net profit	3,968,570	30,565
Sinking fund	550,513	344,000
Surplus	\$3,418,057	\$313,435

*After deduction of manufacturing, selling, administration, etc., expenses and depreciation (\$739,414).
†Deficit.

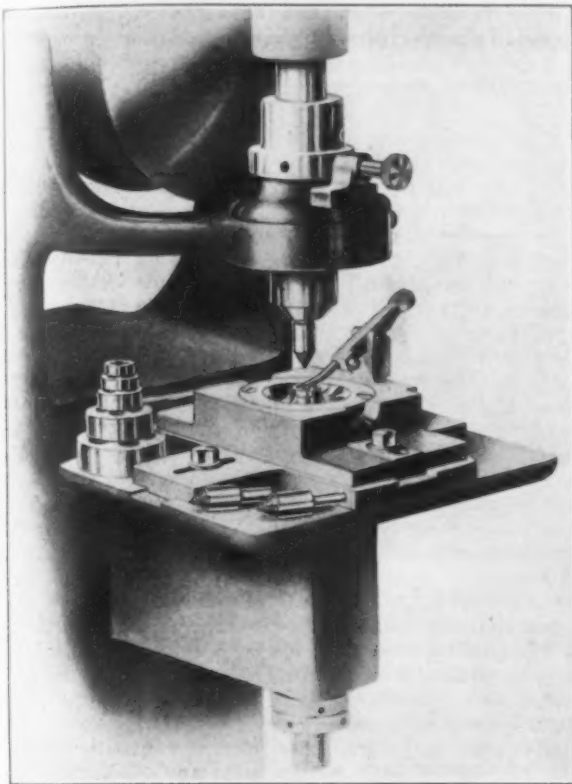
The Newman Mfg. Company, 719 Sycamore Street, Cincinnati, manufacturer of machine-tool attachments, adjustable electric light brackets, brass and bronze work, signs, etc., has added another story to its plant. The structure is now six stories, 40 x 175 ft. It is stated that the company had a very successful year in 1916 and the outlook is promising for this year. In addition to the plant at Cincinnati, the firm maintains a branch at 68 West Washington Street, Chicago.

The Electrical Alloy Company, maker of resistance wires and ribbons, has moved into its new factory building at Morristown, N. J. A. W. Hartigan, of the New York sales department of the Western Electric Company, has been appointed sales manager, with headquarters at 41 Union Square, New York.

*From a paper to be presented by Guillaume Aertsen, assistant to the vice-president Midvale Steel Company, Nicetown, Pa., at the New York meeting in February of the American Institute of Mining Engineers.

Muzzling Machine for Threading Dies

With a view to doing away with hand work in the muzzling of threading dies, the Anderson Die Machine Company, Bridgeport, Conn., has developed a special machine. This operation consists of beveling the first



Beveling the First Two or Three Threads of a Die to Secure Clearance, Which Is Technically Termed Muzzling. Is the Special Field of This Machine, Which Is Equipped with a Somewhat Novel Speed Changing Mechanism That Is Barely Visible at the Top of the Illustration

two or three threads of the die to provide clearance so that the die will cut without dragging. This clearance, it is explained, is very similar to that on the end of a machine reamer except that in the die it is internal and thus differs from that of the reamer.

The machine essentially consists of a hollow vertical spindle mounted in a frame and running on ball bearings. A friction member driven by a spherical faced disk at the end of the armature shaft of the motor is mounted on the spindle to vary the speed in much the same way as was done in the case of the die tapping machine which was illustrated in *THE IRON AGE*, Nov. 23, 1916. In this way, it is pointed out, it is possible by tilting the motor, which is pivoted in the frame of the machine, to change the speed of the cutter used. A bolt at the side or front of the machine is relied upon to lock the spindle and enable the operator to fasten the cutter, which is of the maker's superhelical type, securely in the split collet provided. A sleeve or draw-bar similar to that used in an ordinary bench lathe and controlled by a knob or handwheel at the top of the machine operates the chuck mechanism.

The cutter employed resembles a cone, the angle of the side depending on the number of threads which it is desired to bevel. A cone having an angle of 30 deg. on the side will machine a clearance of about two and one-half to three threads, while another having an angle of 45 deg. will give a clearance of one and one-half threads only. It is explained that in making dies it is customary to back off or relieve one side more than the other, three threads on one side, for example, being relieved and only one and one-half on the opposite one. In this way the die can be used for cutting long rods where it is not important to cut close to a shoulder, although threads can be cut very close to a shoulder or extension by reversing the die.

The rectangular table has a cross-wise slot into which the die holding fixture is secured. This consists

of two slides to permit adjustment in all directions, thus making it possible to operate the large as well as the small diameters and also vary the amount of clearance on the cutting edges of the die. A pivoted finger mechanism is located on the upper slide of the fixture and is capable of adjustment on it. Its function is to locate the cutting edge of the die that is being finished in the right position with relation to the cutter. The finger is pressed down by a spring into the openings of the die and rests with a slight tension on the top. The construction is such that the die can be rotated under the finger from one cutting edge to the other, an arrangement which tends toward rapid production. It is possible to remove the portion of the finger that engages the die and substitute the various shapes and forms required by inserting them in a holder.

A square quill, the lower end of which is threaded, supports the table, and two knurled nuts coming in contact with the lower face of the adjustable knee that carries the table spindle are located on this threaded portion. A foot treadle mechanism located at the lower right side of the pedestal raises and lowers the table, the rods connecting the treadle and the lever which operates directly on the end of the table spindle being readily adjustable to suit the operator's convenience. If desired, a safety spring device can be introduced in this connection to give a constant pressure on the table spindle, irrespective of the amount applied by the operator on the foot treadle.

The machine is driven by a 1/6-hp. motor operating at 1700 r.p.m. The current is taken from an ordinary lamp socket through a cord and attachment plug and is controlled by a switch conveniently located on the machine.

A Two-Prong Electric Soldering Iron

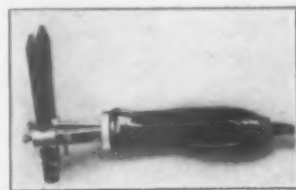
The Clemens Electrical Corporation, Buffalo, has brought out a new type of electric soldering iron. The heat required for soldering, brazing or annealing purposes is generated at the spot where it is needed, thus resulting in a saving in the time of use, and as soon as the tool is removed from the work the circuit is opened, thus effecting a reduction in the amount of current consumed. The iron is designed for use on low-voltage circuits, the maximum potential being 15 volts.

When the object to be soldered or brazed touche the two high-resistance heating points of the iron, the points glow with a white heat directly at the tip. When the soldering is completed and the iron is taken from the work the current ceases to flow at once, as stated, since the circuit between the high resistance points is opened.

The heating points are made of solid bar brass with a nickel finish and are held in position and separated by an asbestos bushing. The voltage required, from 6 to 15 volts, is obtained from a low-voltage transformer, a storage battery or any other source of low-voltage current.

The Safety Appliance Company, designer and manufacturer of industrial safeguards, whose factory and offices have been at 1011-1013 Master Street, has removed to 1429-1431 North Twenty-first Street, Philadelphia, occupying space recently vacated by the Heilprin Mfg. Company. Lionel F. Levy is manager of the Safety Appliance Company.

Imports of chrome iron ore are increasing. For the first 11 months of 1916 they were 103,340 gross tons against 58,486 tons to Dec. 1, 1915, and 62,281 tons to Dec. 1, 1914.



Two High-Resistance Heating Points in this Electric Soldering Iron Generate Heat at the Spot where It Is Required for Soldering, Brazing or Annealing

Temperature Measurements in Steel Making*

Extent to Which They Can Be Determined in Various Stages of Open-Hearth and Bessemer Practice—Methods Used and the Advantages

BY GEORGE K. BURGESS

THE suggestion has often been made that it would be highly desirable, at least for certain grades of steel, to be able to control more certainly, by pyrometric measurement or otherwise, the temperatures of the operation of the open-hearth and other furnaces used in the manufacture of steel and iron.

That the properties of the ingot and finally of the finished steel product are intimately related to the final temperatures attained by the metal in the furnace and to the temperature of casting, has been recognized by metallurgists for a long time, and this question has been very thoroughly treated, especially by Prof. Henry M. Howe, and by A. W. and H. Brearley.†

It is the object of this paper to demonstrate that in so far as casting temperatures of furnaces, steel ingots and similar operations involving the temperatures of streams of iron and steel are concerned, well-known pyrometric methods may be easily applied—if certain recently determined corrections are made and precautions taken—with a relatively high degree of accuracy. Greater but not insurmountable difficulties will be encountered in the case of open-hearth furnace temperatures, while for those of the converter type a ready solution does not seem practicable.

In view of the fact that, in open-hearth practice the temperature to be measured in the furnace itself, in the stream of metal and slag and in the teeming into molds or ingots is usually above 1500 deg. C. (2700 deg. Fahr.) and may reach to above 1750 deg. C. (or 3200 deg. Fahr.), it is manifest that we are limited to the optical and radiation types of pyrometer. Preference will be given to the former for the reason that the errors in the use of the radiation pyrometer caused by intervening gases, distance, size and specific radiation (emissivity) of objects sighted upon are greater and more uncertain than with the several forms of optical pyrometer using monochromatic light.

Furnace Temperatures

Although one may arrange to observe temperatures of any portion of the open-hearth furnace, and also of the slag surface, what one is mainly interested in is the temperature of the metal, which bears but a remote relation to that of the roof and walls on which the heat of the fuel impinges.

Pyrometric control of temperatures of the roof is easy and may be exact and, although somewhat misleading, may also be made without serious interference from gases and smoke by sighting through suitably placed ports. With a knowledge of the melting range of the roof and arches, the wasting away of the bricks by overheating may be retarded by pyrometric control. Observation of temperatures within the furnace are simpler than of streams of metal or slag, for no correction of any importance has to be applied to the optical pyrometer readings for selective radiation.

The temperature conditions in the bath of the open-hearth furnace may perhaps be most easily determined by sighting an optical pyrometer through a peep hole in a door or through a port upon the surface of slag, preferably near the center of the bath. This temperature is not usually that of the metal but does not, in general, appear to be far removed from the metal temperature especially as the time of tapping the furnace approaches and the fuel supply has been fairly regular and uniform.

*From the abstract of a paper to be published by the U. S. Bureau of Standards and presented at the February meeting in New York of the American Institute of Mining Engineers. The author is chief of the Division of Metallurgy of the Bureau.

†A. W. and H. Brearley: Some Properties of Ingots, *Journal of Iron and Steel Institute of Great Britain*, September, 1916. Also *THE IRON AGE*, Oct. 26 and Nov. 2, 1916.

The temperature of the metal itself may be determined—but not as readily and surely as one could wish—by removing with a preheated spoon some 50 lb. and sighting upon the surface of the metal contained in the spoon with an optical pyrometer, taking a series of temperature-time readings and noting exactly the instant of withdrawal of metal and of temperature readings, from which data the temperature of the metal in the furnace may be estimated. Here complications arise, such as the slag residue and the formation of oxides on the surface, their solidification sometimes before the steel, and other surface effects dependent upon the condition of the steel, escape of gases, etc., with attendant uncertainties in temperature readings, the speed required in taking readings and other difficulties of rapid manipulation and operations, for which at least three persons are required, whereas one observer is sufficient in taking temperatures of furnace and slag.

At present, no pyrometric method seems adapted to give satisfactorily the temperature of the metal in the Bessemer converter. The apparent temperature of the flames may of course be observed but this has yet to be shown to bear any definite relation to the metal temperature. There are fortunately other methods of recognizing the status of the reactions and the moment when a Bessemer heat is ready to cast.

Furnace Tapping and Teeming Temperatures

If one can get a side view and within 50 ft. of the left side of the tapping stream of an open-hearth furnace or Bessemer converter, accurate observations may easily be taken of its temperature. Even when sighting upon the stream from a distance good observations may be obtained. The observed temperatures here must be corrected for the emissivity or specific radiation of the metal or slag, a correction depending on the radiation which is characteristic of the stream surface, and upon the colored light used in the pyrometer.

The greater brightness of the slag, readily noticed with the unaided eye, is caused by its higher emissivity and, also, in part, sometimes to the fact that it may be slightly hotter than the metal. Slag, however, is not a material of uniform composition nor is its brightness always the same from one cast to another at the same temperature. It follows that pyrometric estimations of slag-stream temperatures may be attended with considerable uncertainty.

Here we have almost ideal conditions for obtaining accurately the temperature of the stream, which is clean metal with a slight evanescent surface of oxide giving to the stream, viewed through red glass, a characteristic transparent appearance, the color of the metal being greenish and of the oxide yellow. The corrections to be applied to the temperatures for the emissivity of iron viewed in red light have been exactly determined.

Limitations as to Pyrometer Station

The arrangement of the open-hearth or Bessemer mills is a considerable factor as to convenience with which temperature observations of furnace, tapping and teeming may be taken. Usually it is possible, however, to bring the pyrometer to within 10 ft. of the stream when teeming ingots; but distant observations—even to 100 ft. or more—may be taken with but a slight increase in uncertainty. These difficulties of pyrometer stations can usually be readily overcome. It is evidently necessary to have a portable apparatus that may be moved about while taking observations; and one that may be sighted from a considerable dis-

tance on a stream issuing from a 2-in. or 3-in. nozzle. The abstract of the original paper gives the result of temperature observations somewhat in detail, but not to the extent that the complete paper does, which embraces pyrometric observations of open-hearth and Bessemer furnace, teeming and metal temperatures with detailed tables. The conclusions only are here presented.

Summary and Conclusions

The problem of temperature measurement and pyrometric control of furnace casting and ingot teeming temperatures is shown, by a series of observations taken in several steel plants, to present no serious difficulties or uncertainties.

For this purpose the most satisfactory type of instrument is one of the optical pyrometers using monochromatic light and permitting observation from a distance of streams of metal.

It is shown that the necessary corrections to the observed optical pyrometer readings for emissivity of metal and oxides to give true temperatures, are sufficiently well known, but there may be uncertainty in the case of liquid slags.

For streams of liquid iron or steel the most probable value of emissivity to take, with a pyrometer using red light of wave length $\lambda = 0.65\mu$, is $e = 0.40$, corresponding to a correction of 139 deg. for an observed temperature of 1500 deg. C. The value of e for liquid slags is usually about 0.65 but varies with composition of the slag.

Determination of the temperature of the charge of Bessemer converters is not deemed practicable by pyrometric methods.

The operation of the open-hearth furnace can be gaged by the pyrometer, it being possible to control readily the temperature of the roof and of the bath of metal and slag by observations taken through ports; and the temperature of the metal may be had at any instant, with a fair degree of exactness, by observation with the optical pyrometer of metal removed in a spoon.

The temperatures of the roof of an open-hearth furnace are shown to bear no necessary relation to that of the metal bath, which again is shown may have zones of considerable differences in temperature depending upon the operation of the furnace.

The temperature of the roof of an open-hearth furnace, dependent upon the firing practice, may vary rapidly and within wide limits, 1550 to 1750 deg. C. The temperature of the open-hearth bath is usually kept between 1600 and 1670 deg. C.

There is a remarkable degree of uniformity in casting temperature actually acquired by the melters in practice. Thus, for 19 consecutive Bessemer heats the teeming temperatures of the ingots were all between 1500 and 1555 deg. C., and a similar degree of concordance, although at slightly higher temperatures were found in the open-hearth practice of several mills.

It is believed that a continuous, systematic following of the temperature, by the methods above outlined, of the various furnace and casting practices, on the part of steel and iron mills, would show the possibility of improvements, and greater certainty of production in quality of product; also changes and the effects of variation in ingot or furnace practice could undoubtedly be carried out with greater certainty than at present appears to be the case.

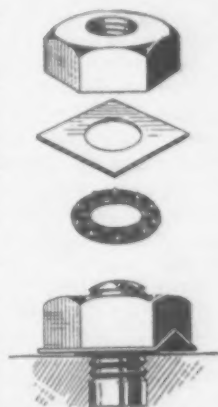
Several observers assisted in taking the observations at the steel plants at Sparrows Point, Md., Philadelphia and Bethlehem, Pa., and Washington, D. C.

How self-aligning ball bearings compensate for inaccuracies in the alignment of shafting and even bends was recently brought out by an accident in a plant manufacturing paraffined paper containers. A shaft was hit and bent to an angle of 10 deg. On investigation it was found that the machine could continue to operate satisfactorily in spite of the bent shaft, which was mounted on ball bearings manufactured by the S K F Ball Bearing Company, Hartford, Conn., the self-aligning feature compensating for the curvature.

A Nut Lock with Special Washers

An interesting nut lock for use with either bolts or cap screws has been brought out by F. R. Blair & Co., Inc., 50 Church Street, New York City. The design renders the device inapplicable to hardened steel but it may be used on soft steel, cast iron, brass, bronze, aluminum, etc., and, it is explained, removed and used over and over again. It is intended as a substitute for a castellated nut and cotter pin, it being emphasized that the lock with its three parts can be applied and locked easier and in less time than a cotter pin can be inserted and spread.

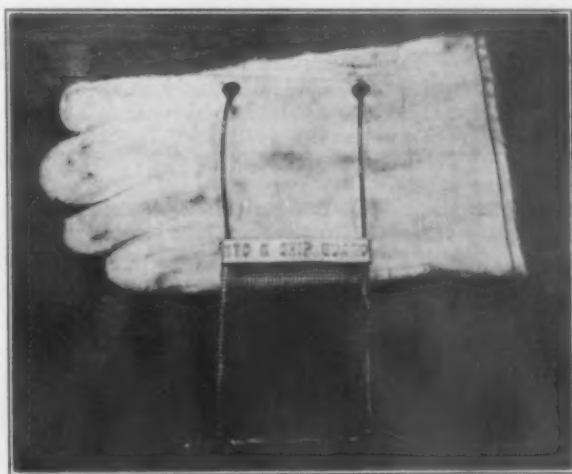
As is apparent from the accompanying illustration, the nut lock consists of the nut and two special washers, one a square piece of flat metal while the other, which is of the standard ring type, is provided with a number of teeth on the upper surface. The washer with the teeth is first slipped over the bolt followed by the flat washer and the nut, the last being tightened as far as possible, after which the corner of the flat square washer is bent up. The lock is applicable to bolts or cap screws ranging from $\frac{5}{16}$ to $\frac{1}{2}$ in. in diameter. If desired, special shapes for use in counter-bored holes, against shoulders, etc., can be supplied in place of the regular square washer shown.



In Applying This Nut Lock to a Bolt the Washers and the Nut Are Put on in the Order Shown in the Upper Portion of the Illustration after Which the Nut Is Tightened and the Corner of the Square Washer Bent Up

Chipping Guard Used in National Tube Works

A shield for protection against flying chips, as when using the pneumatic chipping hammer, has been developed at one of the plants of the National Tube Com-



With the Chipping Tool Held or Directed by the Gloved Hand, the Guard Automatically Intercepts Hurting Metal Particles

pany. It consists of a wire screen riveted to and suspended from a glove. The fin to be chipped off lies between the shield and the chisel which drives the chips against the guard.

Peace trade in steel is made the subject of a little publication of the American Steel Export Company, Woolworth Building, New York. It contains an article by the vice-president of the company, C. B. McElhany, appearing originally in the *Annalist*, New York, and an article in *THE IRON AGE*, of Dec. 14, 1916, covering an interview with the general sales manager of the company, Samuel A. Benner, on his return from London and Petrograd.

HARDNESS TESTS FOR STEEL

Indentation and Wear Tests Compared—Yield Point as a Measure—Hardness Defined

THE investigations undertaken by the Hardness Test Research Committee of the Institution of Mechanical Engineers (British) were begun in consequence of the difficulty experienced in practice of fixing a standard of hardness, especially where bearings are concerned in which shafts or the like are run at high speed under heavy loads, the indentation test, although giving useful information in the case of fairly soft metal, being less satisfactory with the harder material under consideration. The report just issued contains particulars of tests carried on by Dr. Stanton and Mr. Batson of the National Physical Laboratory. The problem to be solved was complicated by the fact that it contains a twofold unknown quantity—the unknown ultimate resistance of the material to the unknown stress distribution.

Although engineers are beginning to apply wear tests for determining the disintegration of the surface of steel rails under heavy rolling loads and the wear of lubricated surfaces under relatively low pressure and high rate of slipping, yet many are still inclined to regard indentation tests for hardness as indicating a definite property of material and as a measure of the resistance offered to any kind of wear.

Ratio of Indentation and Wear Tests

The experiments were therefore performed to establish a comparison between the result of indentation and wear tests on a wide range of material, namely, six differently heat-treated specimens of nickel-chromium steel with 0.7 per cent carbon, 2.5 per cent nickel, and 2 per cent chromium, and two specimens of manganese steel with 1.36 per cent carbon, 0.36 per cent silicon, and 13.10 per cent manganese. The first tests were made with a Saniter machine, and the results indicated that, for the hardened steels, the resistance to rolling abrasion is roughly proportioned to the ball-hardness number, although this is not invariably so, there being numerous instances of considerable divergence from the approximate relation.

On the other hand, the ratio between the two kinds of test is very high with the manganese steels. The fact, mentioned by Sir Robert Hadfield in an appendix to the report, that the resistance of manganese steels to rolling abrasion is the resistance to deformation of already deformed material, was confirmed by the scleroscope tests, the hardness being practically doubled by the rolling pressure in the Saniter tester, whereas the increase, for the hardened steels, was only between 4 and 15 per cent. Even allowing for this peculiarity, the resistance of the manganese steels to rolling abrasion is found to be much higher than the ball-hardness test would have led one to believe.

Testing the Sliding Wear

For the tests relating to the sliding wear of surfaces under relatively low pressure and large relative movement, in which small particles are bodily detached without permanently distorting those in the immediate vicinity, an apparatus was devised in which the abrading ring is mounted in such a way that both ring and test specimen complete a revolution in the same time, the line of contact remaining fixed in relation to the machine, so as to obtain a definite amount of slip ($\frac{1}{4}$ in. per revolution of the specimen). The abraded particles were removed and the temperature kept down by directing a jet of compressed air on the surface of the specimen all through the test. This tester was found to prevent the gradual hardening of the surface that occurs under the rolling abrasion test, so that the material is not deformed by the test itself—except, to some extent, in the case of manganese steels, the scleroscope number of which increases by an average of 7.5 per cent during the sliding test.

From the tabulated results given in the report it appears that, whereas the ordinary carbon steels show a fairly constant ratio between the Brinell hardness

number and the sliding abrasion test, there is an enormous variation in the case of the special steels, the resistance to abrasion of a steel with the Brinell No. 165-175 being expressed by 63, while one with the Brinell No. 265-271 has a resistance to abrasion of 200, and an increase in the Brinell hardness to 330-332 is accompanied by an abrasion value of 500, this value again sinking to 200 with the steel having a Brinell No. 346-364. It is, therefore, concluded that, generally speaking, the Brinell hardness numbers of a miscellaneous selection of steels are not a safe indication of their resistance to wear.

In an appendix to the report, Sir Robert Hadfield gives his conception of "hardness" as "resistance to deformation," and since the resistance to deformation of a material depends on how much it is deformed, and the rate of increase of load with deformation varies in different materials, it is useless to fix an arbitrary amount of deformation and measure the load, for of two materials A and B, A may require less load than B to deform it 5 per cent, but B may require less load than A to deform it 50 per cent. Also, brittle materials will not deform at all.

Yield Point as a Measure of Hardness

According to the accepted criterion that yield point is the measure of hardness, manganese steel is of a soft nature, since its yield point is low, and a very small load produces permanent deformation. Yet in the ordinary acceptance of the term this material is considered very hard in wear, the explanation being that because the act of abrasion deforms the material locally, its resistance to further deformation increases enormously thereby, and the material actually abraded off is not manganese steel in its natural state, but a quite different material—deformed manganese steel, which is hard.

There seems to be no way of measuring the resistance to deformation or the true "hardness" of deformed materials except in an approximate manner; and, moreover, the action of deformation in practical use is to deform some parts more than others, in no regular and definite manner. Each of the current methods of testing hardness, however, deforms the material in its own particular fashion. It deforms one part of the material more than another, and the relative degrees of deformation are quite different according to the method employed. For example, in abrasion or scratch methods, some portion of the material is completely detached, that is, deformed to the point of rupture; in indentation tests the material is generally not broken. In each case the remaining portions are deformed in varying degrees from nil to the maximum and not in equal gradients. It cannot, therefore, be expected that these methods should agree among themselves, or that the results should represent some specific property of the material.

A Definition of Hardness

Dr. A. E. H. Tutton, in an appendix to this report, defines the hardness of a solid substance as the resistance offered by a smooth surface of the substance to abrasion, or scratching by contact with a sharp fragment of another substance of slightly greater and definitely known hardness. Particles of the softer substance are torn away, their cohesion being overcome, and therefore hardness is intimately connected with cohesion. If the solid substance is crystallized, the hardness varies slightly with the direction within the crystal, being always lower along a direction of cleavage than along the direction perpendicular thereto, because the cohesion is lower and the particles are, consequently, more readily torn off from the cleavage face. Moreover, high specific gravity (density) is generally accompanied by great hardness, since the point of the space-lattice (in a crystal) being closer together the denser the substance, greater difficulty is experienced in overcoming their cohesion.

The Oswego Iron & Steel Company's blast furnace at Oswego, Ore., is to be wrecked and the equipment sold for scrap. The furnace was first built in 1867.



BEARINGS IN STEEL MILLS

Roller Type Employed as an Absorber of Shocks and Jars

FLEXIBLE roller bearings are playing an important part in increasing the production of the steel mills in the Pittsburgh district, according to E. E. Eby, engineer for the Hyatt Roller Bearing Company, Newark, N. J. The bearing has a flexible roller, which absorbs the shocks and jars incident to the operation of steel mill equipment. Some idea of the wide range of use of the bearings is afforded by the accompanying illustrations of a charging car and a large spacing table. Other applications of the bearing include plate mills, ingot cars, wire mill buggies and the cooling beds of billet, rail and bar mills.

Severe operating conditions, Mr. Eby states, are encountered in the case of the charging cars, among which may be mentioned abuse of bearings, high temperatures and poor track conditions. About 200 ingot and charging cars equipped with flexible roller bearings are operated by the Carnegie Steel Company. Dynamometer tests have shown that the flexible roller bearing reduces the drawbar pull to such an extent that a complete heat can be taken in one train with a single locomotive, while with babbitt or cast-iron bearings the heat had to be divided between two trains or two engines employed to haul a single train. Advantage is taken of the efficiency of the bearing in some plants by increasing the speed of the train, thus permitting the ingots to reach the soaking pits as soon as possible.

A complete table equipped with these bearings is operated by the Carnegie Steel Company, and the friction load has been reduced from 25 to 12 hp. In this particular case the roller bearings replaced babbitt ones that were not ring oiled, but even where brass bearings having the ring oiling feature were used it has been possible to effect a marked saving in power. A few rolls of a 143-in. plate mill of the Cambria Steel Company were equipped with flexible roller bearings about a year ago and subsequently the entire table was changed. As rolled

material will lie stationary on the table for comparatively long periods of time the rolls become heated with the result that the babbitt melts out of the bearing and the lubricating oil is also driven off, thus necessitating frequent lubrication. With the flexible roller bearings this does not occur.

The buggies in wire mills afford another interesting application. These have two large wheels at one end and a caster at the other. The American Steel & Wire Company has equipped some of its buggies with flexible roller bearings with satisfactory results. A tractor is frequently employed for moving the buggies so that it is possible either to pull more with the same amount of power or haul the same number as before and reduce the fuel consumption.

Federal Export Corporation's Growth

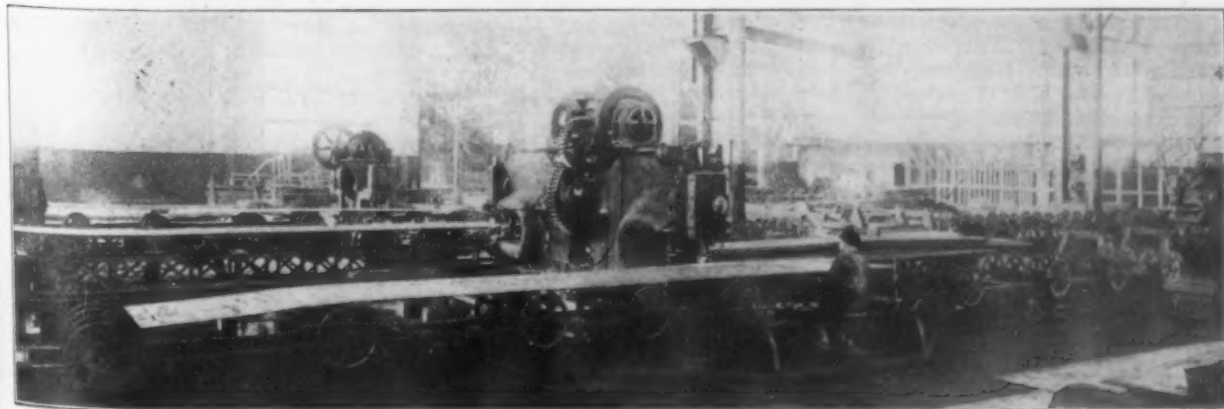
The Federal Export Corporation has removed from 111 Broadway to new and larger offices at 115 Broadway, suite 415, New York. The name of the Federal Shipping Company, which is owned by the corporation and operates the Anglo-French line, has been changed to the Cosmopolitan Shipping Company. The corporation continues to enlarge its scope and organization, and now has associated with it Ralph P. Zint, who was for 18 years connected with the Chicago office of the Republic Iron & Steel Company, and Jules Mertens, formerly of Belgium. The Cosmopolitan Shipping Company owns or controls three steamers which are running to French ports. The Federal Export Corporation has found a particularly good field for railroad materials in France.

Bethlehem Steel Acquires Lehigh Coke Company

Announcement has been made by the Bethlehem Steel Company that it has acquired the Lehigh Coke Company, and has taken over the active management of the plant at Didier, Pa. In the reorganization, E. G. Grace was elected chairman of the board; W. F. Roberts, president; C. A. Buck, vice-president; B. H. Jones, secretary and treasurer, and F. A. Shick, comptroller. For the time being, the plant will continue to be operated under the name of the Lehigh Coke Company.

The iron mines and blast furnaces at Caen (Normandy), France, are being worked by the government and the industry is flourishing. A large modern plant is being installed and the output of iron ore in that district has reached 1,000,000 metric tons per year.

The Hurley-Mason Company, Hoge Building, Seattle, Wash., has secured a contract for constructing 60 coke ovens for the Wilkeson Coal & Coke Company, Wilkeson, Wash. This is one of the largest contracts of its kind ever let in the Northwest.



Another Example of Steel-Mill Equipment in Which Roller Bearings Are Used, a Spacing Table at the Sparrows Point Plant of the Bethlehem Steel Company

CRUCIBLE TOOL STEEL

Precautions to Be Observed in the Different Stages of Its Manufacture

At a meeting of the salesmen of the Vanadium-Alloys Steel Company at Pittsburgh, Jan. 3, the president, Roy C. McKenna, presented a paper on crucible tool steel with particular reference to methods of manufacturing high-speed steel. Some extracts are given below.

Some will say that on account of our increased knowledge of chemistry and metallurgy, the making of crucible tool steel has ceased to be an art and has become a science. The making of crucible tool steel is still an art, aided by science. If the making of crucible tool steel were an exact science, not an art, there would be no difference in steels of the same grade and our competitors would make a tool steel equal to our own.

Processes as Important as Composition

Equally as important as the composition of the steel are the melting, hammering or forging and rolling. If a steel is melted too long it is spoiled, regardless of chemical content. It must be heated uniformly; neither too fast nor too slow. The head melter of a crucible steel plant is an important personage and his compensation is only exceeded by that of high officials of the company.

The importance of hammering crucible and high-speed steel is admitted by all informed on the subject. The hammer shop is so important that it is the general practice to allow the head hammerman to employ his helpers, and his compensation is based on tonnage and the quality of his work.

The rolling of crucible or high-speed steel is second in importance only to hammering. Good ingots may be spoiled in hammering or rolling. It is not necessary for me to speak of annealing and tempering of steel at this time, for every man here is thoroughly versed on these subjects and realizes their importance.

We were prepared, so that when the unprecedented demand for high-speed steel, due to the European war, came, we were not only able to increase our production without detriment to quality, but have built an organization able to carry on with increased vigor the contest to come when the battlefields of Europe are again under the plow. The contest will not be alone with manufacturers of crucible tool steel in America, but against the competition of all Europe; unhandicapped by 8 hr. a day, unmolested by inane factory laws, and unmoved by appeals of their employees for better working conditions. The military training and efficiency reached in Europe in the manufacture of munitions of war would make dangerous competition under any tariff, and America will be nearer free trade than any large nation on earth when the European war is over.

The Crucible Process

The crucible process of making steel is the simplest method known, but it is also the most costly. Where quality in steel is desired, steel made by crucible process is specified. It is not my intention to go into the respective merits of crucible and electric furnace practice, except that crucible steel practice has earned its right to exist from time immemorial, although the most costly, on account of the importance of melting a quality steel slowly and at a uniform heat. I must leave it to others to prove whether or not a mass of 3 to 6 tons of steel in an electric furnace can be melted as evenly and uniformly as in a crucible containing not over 80 to 90 lb. It is my prophecy that as long as tool steel of quality is required, crucible practice will be continued. The electric furnace has its place, and there is no question of the superiority of electric furnace steel over open-hearth.

Our steel is melted in two 30-pot crucible furnaces, using graphite crucibles and natural gas. The "mix"

for high-speed steel is made up of base materials such as low-phosphorus melting iron, charcoal, high-speed steel which has been rejected in the course of manufacture on account of structure, not analysis, etc. All materials in the mix are carefully weighed to the fraction of an ounce. The more expensive materials are carefully prepared in a room close to the furnace, known as the "medicine room." Ferrovandium, ferro-tungsten and ferrochrome are three important elements in the medicine. These alloys are weighed even more carefully than the material in the mix, if that were possible.

A formula once adopted for the mix and medicine is religiously adhered to. In adopting a formula for high-speed steel it is as important that provision be made to have a slag of correct thickness and density as it is to have the proper amounts of tungsten, vanadium and other ingredients. Great care is taken to preserve the uniformity of the mix and medicine. The hardening agents are placed at the bottom of the crucible and the iron carefully packed over them. The materials most easily melted are generally placed near the top of the crucibles, so that upon melting to the density of molasses, they cover those elements liable to gather carbon from the graphite crucibles.

From Crucible to Warehouse

Teeming is an important operation, performed by the melter himself. The slag is skimmed off and the teemer quickly empties the remaining contents of the crucible into the mold. Inasmuch as the molds are small in section, it requires a very high order of skill to teem properly, as the stream of melted steel must not at any time strike against the sides of the mold. In case of large ingots made for special purposes, ladle heats are made. In a ladle heat, the entire 30 pots may be poured into the ladle and from the ladle into the large molds.

It is important that all ingots be cooled gradually, and in case of large ingots from ladle heats, they are rushed, red hot before they can become set, to the hammer furnace. The rapid cooling of an ingot would develop serious defects or cracks. On account of the outside of the ingot cooling more rapidly than the inside, there is in every ingot a "pipe." This pipe is filled by placing a hot-top brick on the top of the mold and pouring the melted steel into the pipe.

Although we may apparently be successful in filling the pipe in an ingot, it is found upon hammering that the pipe end of the ingot will open, and to prevent this tendency of the pipe to extend further into the ingot, the hammer man crops from 4 to 6 in. off the pipe end. When the hammered billet is cogged it is again necessary for the hammer man to crop the billet.

The importance of hammering high-speed steel at correct temperature is second only to that of melting. The heat at which to hammer high-speed steel is left to the judgment of the hammerman. It is also upon the hammerman's eye that we depend to detect any defects that may develop in the structure of the steel. These defects he removes by chipping. Any defect which may develop and which may not be discovered in the hammering will develop in the rolling of the steel and will cause the rejection of the bar.

Hill Clutch Company Efficiency Meeting

The Hill Clutch Company, Cleveland, power transmission machinery, held another of its regular get-together meetings Feb. 6 for all officials, superintendents and department heads. About 50 were present. All were guests of the company at supper served in the company restaurant. After an address by H. J. Smith, chief engineer and works manager, on the objects and aims of these meetings, general discussion followed on shop production, efficiency, etc. Papers were read by F. W. Sebelin, superintendent, on "Shop Efficiency and Scientific Management"; H. Switzer, foundry superintendent, on "Betterment of Foundry Production," and H. F. Corrigan, sales department, on "Service as Viewed Through the Customer's Eye."

WASTE HEAT UTILIZATION*

Coke Ovens and Heating Furnaces as Fruitful Fields for Fuel Economy

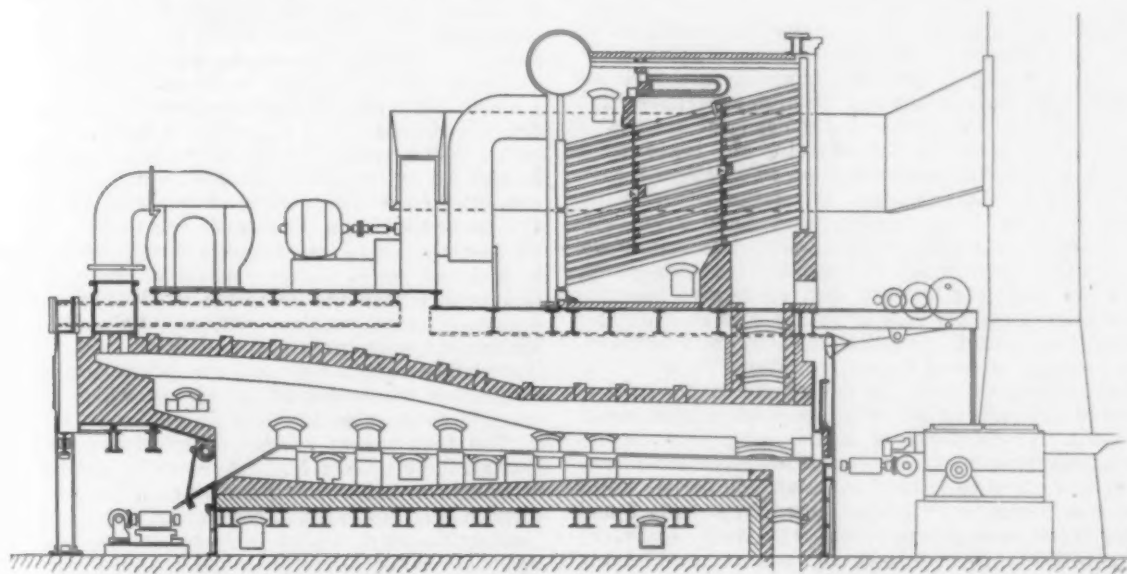
WHILE it is true that beehive coke ovens are gradually being replaced with by-product ovens, there are still a very large number of the former in operation. Since there are few, if any, coals from which good coke can be made in beehive ovens that cannot be satisfactorily coked in by-product ovens if properly handled, it is questionable whether more beehive ovens will ever be built. On the other hand, it will be a number of years before all of the existing beehive ovens can be replaced by the more modern type.

Remarkable results are being secured from modern waste-heat boilers utilizing gases from beehive ovens, and the possibilities of saving, due to this utilization, until such time as beehive ovens are replaced, are great.

From the nature of the beehive-oven coking process, the quantity of gas available from each oven is large. These weights will vary with the analysis of the coal

lishing of some of the results secured from the first unit put into service. These are given in columns 3 and 4 of table 1. The gas weights in the table are approximate, but within 10 per cent of the actual weights. This installation consisted of a Babcock & Wilcox boiler 18 sections wide, each section being made up of twenty-six 20-ft. tubes and containing 10,200 sq. ft. of heating surface. The boiler is equipped with a superheater and furnished with a turbine-driven induced-draft fan.

During the time the tests were run on the Babcock & Wilcox boiler the ovens were being operated to meet plant demands for coke, some ovens making 24-hr., some 36-hr., and others 48-hr. coke. The speed of the fan was regulated to handle an approximately constant weight of gas, and as ovens were cut in or cut out, other boilers would be put into service and taken off again when the gas weights were reduced. Because of this fact it was practically impossible to determine the actual amount of coal coked corresponding to the capacity developed by the Babcock & Wilcox boiler. It is possible, however, to check pretty definitely the gas weight passing through the boiler, and from this weight



Waste-Heat Boiler Applied to Reheating Furnace in Structural Mill of Bethlehem Steel Company

coked and the class of coke being made. The analysis of the gases escaping from the individual ovens will vary widely during different periods of the coking operation. Where a large number of ovens, however, are connected by a single flue to a boiler, or boilers, the average analysis at the boiler entrance will not show a particularly wide variation due to the fact that different ovens in the range or block are at different stages of coke making. At certain periods during operation large quantities of carbon monoxide pass off from the ovens and burn in the flues; in no plant investigated has there been noticed any secondary combustion within the boiler. For estimating purposes, the gas weight available may be taken as from 6 to 7 lb. per lb. of coal coked per hour.

The temperature of the gases leaving the individual ovens is high, probably averaging between 2000 and 2200 deg. The temperature of these gases as they enter any boiler that is installed will depend upon the length, design and location of the connecting flues. Some typical entering temperatures are given in table 1. Rather complete figures are available from three different plants in which boilers are installed for this class of work, the first two representing early waste-heat practice and the third representing the modern waste-heat boiler.

It has not been possible to secure permission to name the owners of the third and distinctly modern installation, although they have kindly consented to the pub-

lishing of some of the results secured from the first unit put into service. These are given in columns 3 and 4 of table 1.

The performance of the first boiler unit has been so satisfactory that the owners have purchased, since its installation, six additional units for use with their ovens. These are similar to the one described, except that they are 27 sections wide instead of 18, each unit containing 15,300 sq. ft. of heating surface, or a total of 9180 h.p. for the six units.

The baffle arrangement in the boiler at the Priestman Collieries is not known. It is probable, however, that the gas-passage areas were somewhat larger than standard, as the draft loss through the boiler is considerably less than would be expected for an equal weight of gas in coal-fired practice. The exit temperature is high but, considering the design of boiler and the weight of gas, cannot be considered excessive. In the report covering the series of tests from which this was taken, a statement is made to the effect that the capacity obtained did not represent the maximum, as, due to a leaky damper, all of the gases from the ovens were not passed through the boiler.

The test at the Frick plant extended over a full week's run of 168 hr. Gas weights and temperatures did vary considerably throughout the week. The lowest temperature noted was approximately 1500 deg., while the highest was 2075. The gas weight here corresponds to about the weight that would be passed through the boilers if they were being operated at about rating, coal-fired. The baffles in these boilers were standard, and the draft loss checks the statement made as to rating. Under such conditions, the exit temperatures, which varied during the test from approximately

*From a paper by Arthur D. Pratt read at the annual meeting of the American Society of Mechanical Engineers, New York, Dec. 6, 1916. A portion of this paper, dealing with the utilization of waste heat from open-hearth furnaces appeared in THE IRON AGE, Dec. 21, 1916.

Table 1—Results of Tests of Waste-Heat Boilers for Beehive Coke Ovens

Test Number.....	1	2	3	4
Plant.....	Priestman Col. Ltd. Newcastle- on-Tyne	Frick Coal & Coke Co. York Run, Pa.		
Location.....				
Beehive ovens.....	22	50 ²	100	100
Coal per hr. per oven, lb.....	173	314		
Kind of draft.....	Natural	Natural	Induced	fan
Boiler.....	Stirling	Stirling	B. & W.	B. & W.
Heating surface, sq. ft.....	1,610	10,800	10,200	10,200
Gas weight, lb. per hr.....	23,200	83,650	125,500	155,100
Gas per hr. per sq. ft. of h. s., lb.....	14.4	7.7	12.2	15.2
Temperatures:				
Gas entering boiler, deg. F.....	1,720 ³	1,804	2,329	2,158
Gas leaving boiler, deg. F.....	450	490	463	477
Drop in temp., deg. F.....	1,070	1,314	1,866	1,681
Draft at boiler damper, in.....	0.56	0.56	4.0	4.4
Draft at boiler inlet, in.....	0.24	0.30	1.9	2.0
Draft loss, in.....	0.32	0.26	2.1	2.4
Horsepower developed.....	187	824	1,756	1,956
Per cent of rated capacity.....	116	76	172	192
Approximate transfer rate (R).....	4.7	3.2	5.6	6.8

¹Three boilers, each of 3600 sq. ft. heating surface.²Temperature leaving ovens 1970 deg. F.³Number of ovens in service varied; an average of 44 were in use during the week of test. The figure given for coal per hour per oven is based on 44 ovens.

475 to 550 deg. and averaged, as given, 490 deg., are no lower than might be expected.

In tests 3 and 4, the interesting features are the low exit-gas temperatures and the high capacities. The exit temperatures of 463 and 477 deg., for ratings of 172 and 192 per cent respectively, are lower by a considerable amount than would be obtained with coal-fired boilers at equal ratings. The design of the boiler to give the high heat-transfer rates noted offers sufficient explanation for these temperatures. In other tests of the Babcock & Wilcox boiler in this series, where the gas weights were such as to give approximately 96 and 128 per cent of rating with entering-gas temperatures of 2013 and 1811 deg., the exit temperatures were 437 and 428 deg., respectively.

In this class of work the saving due to the utilization of waste heat is solely in the value of the steam generated. The amount of such saving may be approximated from the boiler capacities given in table 1. On the basis of 6 to 7 lb. of gas available per pound of coal coked per hour, it will be noted from tests 3 and 4 that 1 hp. was developed for 11.0 and 12.2 lb. of coal coked per hr. respectively, and it would seem conservative to state that with the modern design of waste-heat boiler a horsepower may be developed on the waste gases from 15 lb. of coal coked per hour. At such a return, even granting that beehive ovens will ultimately be replaced with by-product ovens, it would seem that, in numerous plants, an installation of waste-heat boilers would pay for itself many times before such a change could be made. It would be entirely possible, too, in these installations, to design the boilers in such a manner that at the time of replacing the beehive ovens the boilers could be dismantled and reset either for burning coal or coke breeze, or to be fired with by-product coke-oven-gas.

Heating Furnaces

The first boilers for any class of waste-heat work were unquestionably installed with heating furnaces of different descriptions, and the early history of boilers with heating furnaces is in reality the early history of the utilization of waste heat in general. The actual date of the first installation certainly was previous to 1872. Before that date, such boilers as were used in connection with heating or puddling furnaces were of the cylinder or two-flue design.

The IRON AGE, April 6, 1893, describes the early installations of water-tube boilers for this class of work and gives more or less complete results of the performance of a number of these boilers. The first of these installations was made at the plant of the McCullough Iron Works, Wilmington, Del., in 1874, and consisted of two Babcock & Wilcox boilers of seven sections of six 16-ft. tubes. Each boiler contained 860 sq. ft. of heating surface, and in accordance with the practice of the day were rated on the basis of 11½ sq. ft. per hp., or 75 hp.

A number of boilers similar to these were installed after 1874 in the different iron and steel plants throughout the country. Test 1, table 2, is representative of the performance of this design of boiler. At the same plant a test on a cylinder boiler in the same service showed exit temperatures considerably in excess of 1000 deg. compared with 542 deg. for the water-tube boiler. This temperature difference probably represents the difference in efficiency of the two types of boiler in this class of work.

The early waste-heat water-tube boilers with heating furnaces were of the three-pass design. There were, however, a number of factors in heating-furnace work which enabled satisfactory results to be obtained from a design that later was considered more or less impracticable for other classes of waste-heat work. The chief of these was the fact that the draft required at the outlet of the ordinary heating furnace was very low. The boilers were ordinarily set directly over the furnace, and the draft loss between the furnace and boiler was negligible. Furnaces were not driven at the time of the early installations at a rate that is at all comparable with present-day capacity, and the gas weights to be handled were low. Further, the boilers were wide and long compared to the height, so that the gas-passage areas were large in comparison to the heating surface. The high exit temperatures ordinarily found enabled a given height of stack to give a greater draft than would the same height under coal-fired conditions.

In 1892 a type of single-pass waste-heat boiler was introduced by the Babcock & Wilcox Company. It is not quite clear why such a design was developed, but the presumption is that with increased furnace capacities the draft loss through a sufficient amount of heating surface in a three-pass design was great enough to interfere with the operation of the furnace. These boilers were of standard sectional Babcock & Wilcox design, but with tubes 8, 9 and 10 ft. long. The heating surface required to cool the gases sufficiently was obtained in the height of the boilers, which were made from 18 to 27 tubes high.

The first boilers of this description were installed in the rolling mill of N. E. Ayre & Co., Portland, Ore., in 1892; one boiler being set over a box-scrap-heating furnace and the second in connection with a small billet-heating furnace. In table 2, results secured from a boiler of similar design installed in 1901 at the plant of the Cambria Steel Company, Johnstown, Pa., are given. This boiler was of the single-pass type, made up of 10 sections of 27 tubes 10 ft. long and rated at 300 hp.

The results as compared with the earlier three-pass boilers are considerably in favor of that type. Some 7500 hp. of the single-pass design were installed, and in general the results secured were considered commercially satisfactory. Because of the construction,

Table 2—Results of Tests of Waste-Heat Boilers with Steel Furnaces

Test Number.....	1	2	3 ¹	4 ²	5 ²
Plant.....	Penn. Bolt & Nut Co. Lebanon, Pa.	Cambria Steel Co. Johnstown, Pa.	Bethlehem Steel Co.		
Location.....			So. Bethlehem, Pa.		
Furnace.....	Puddling	Heating	Structural Mill Reheating Furnace		
Boiler.....	3 Pass. B. & W.	Single Pass B. & W.	B. & W.	B. & W.	B. & W.
Heating surface sq. ft.....	1196	2,998	5,840	5,840	5,840
Gas weight, lb. per hr.....		16,150	87,571	63,932	80,737
Gas per hour per sq. ft. of h. s., lb.....		5.4	15	11	13.8
Temperatures:					
Gas entering boiler, deg. F.....		1,990 ¹	1,745	1,071	1,445
Gas leaving boiler, deg. F.....	542	729 ²	436	401	418
Drop in temp., deg. F.....		1,261	1,309	670	1,027
Draft at boiler damper, in.....	0.32	0.23	1.87	1.15	1.30
Draft at boiler inlet, in.....		0.19	0.68	0.39	0.34
Draft loss, in.....		0.04	1.19	0.76	0.96
Horsepower developed.....	73.2	152.8	784.1	326	542
Per cent rated capacity.....	61	50.9	134	56	93
Approximate transfer rate (R).....		1.7	6.1	5.0	5.4

¹Optical pyrometer.²Varied at different periods of furnace operation from 604 deg. to 920 deg.

³Tests 3, 4 and 5 on same boiler. No. 3 represents 12-hr. period during which the structural mill was in operation. No. 4 a 12-hr. period with the mill not operating, and No. 5 a continuous run of 104 hr. during which the mill operated 56 hr. and was not in service 48 hr.

the boiler was expensive, and probably for this reason was never as popular as the next design of single-pass waste-heat boiler, which was the Cahall waste-heat boiler, introduced in 1894 by the Aultman & Taylor Machinery Company. This was a single-pass vertical boiler in which the gases were introduced through an annular ring in the mud drum. Baffles were placed in the cone between the tubes with the object of throwing the gases into the tubes, but in view of the temperatures frequently encountered, it is questionable how long such baffles remained in place.

The results secured with this type of boiler were about in line with those of the previous single-pass type, though for a given set of conditions the exit temperatures were probably slightly higher. The Cahall boilers were popular, however, in the iron and steel industry, and over 20,000 hp. were installed.

In 1914 the first waste-heat boilers of strictly modern design and utilizing the theory of high gas velocity were installed for heating furnace work by the Bethlehem Steel Company. These boilers were of the general design described in connection with open-hearth-steel practice,* and were made up of 19 sections of 17 tubes 16 ft. long. They were rated at 584 hp. each, were equipped with superheaters designed to give approximately 75 deg. of superheat, and furnished with motor-driven induced-draft fans. They were set in connection with two 28-in. structural-mill reheating furnaces, the approximate arrangement of furnace, boiler and fan being shown in Fig. 1. An extensive series of tests was run on one of these boilers in the early part of 1915. During these tests the structural mill was operated during certain shifts of 12 hr., while during other shifts the mill was not in service, though the furnace was kept hot. Under these conditions, since the temperatures were considerably lower while the mill was in operation, tests covering a wide range of gas temperatures are available, and the boiler performance under such conditions may be noted. Table 2 gives three of the tests on this boiler. Test 3 of this table represents a 12-hr. period during which the mill was in operation, test 4 a 12-hr. period during which the mill was out of service, and test 5 a continuous run of 104 hr., during which the mill was being operated for 56 hr. and was out of service 48 hr.

As in all previous tests, the interesting feature brought out by a comparison of early and modern results is the increase in capacity and decrease in exit temperatures in favor of the modern design. These lower exit temperatures further are secured with gas weights per square foot of heating surface greatly in excess of early practice.

The draft loss through the modern boiler, as indicated in the last three tests of table 2, is reasonably high, though not nearly as great as found in open-hearth waste-heat practice. Since the fan on this boiler was motor-driven, none of the power required for such drive could be reclaimed in the boiler feed. The amount of power required, however, was small, the maximum for the whole series of tests being about 2 per cent, while the average was 1.55 per cent of the total power generated by the boiler.

In this class of work the only saving through the use of waste-heat boilers is the value of the steam generated. This, however, is a considerable item, and it would appear that there are numerous industrial furnaces that are similar to heating and puddling furnaces, and where the temperatures are comparable, with which the installation of waste-heat boilers can show a handsome profit on any investment made.

*See THE IRON AGE, Dec. 21, 1916, page 1423.

The Atkins Pioneers, men associated for 20 years or more with E. C. Atkins & Co., saw makers, Indianapolis, celebrated the eleventh anniversary of their organization with a banquet at Indianapolis, Feb. 10, followed by a theater party. The association began in 1906 with 62 members and the present membership is 121. The oldest member, who had a record of 51 years' continuous service, died last September. The oldest living member has been in the Atkins service for 47 years.

A 12-In. Lathe for Light Toolroom Work

For use in the toolroom and also for manufacturing work where accurate machining is required, the Master Machine Works, 110 West Fortieth Street, New York City, has brought out a 12-in. lathe. A four-change feed box is provided for thread cutting and six speed changes are obtained by manipulating two levers on the headstock.

The bed has both V and flat bearing surfaces, the former having a wide spread. Bracing is relied upon to minimize the amount of vibration produced in cutting, and with a view to giving a steady carriage motion the splined lead screw is set directly underneath the guides as shown. The lead screw is splined for the driving worm, which operates both the automatic cross and longitudinal feeds. This arrangement permits the thread on the lead screw to be used for screw cutting



A Four-Change Gearbox Provides Six Spindle Speeds Ranging from 28 to 418 R.p.m. and for Cutting from 3 to 64 Threads per Inch with This 12-In. Toolroom Lathe

only, and as only the split half-nut is employed it is pointed out that the life of the screw is greatly prolonged. The cross-feed screw has a micrometer collar graduated to read to 0.001 in. All of the apron mechanism has been made simple and rigid with a view to insuring smooth operation.

Steel gears controlled by two conveniently located levers on the headstock provide for six different spindle speeds ranging from 28 to 418 r.p.m. A positive clutch is employed for driving the spindle and the speed changes are arranged to prevent two different rates from being engaged at the same time. A hole extends through the spindle to accommodate draw-in attachments and collets. The nose, which runs in phosphor bronze bearings, is partly threaded to receive a chuck or faceplate and is provided with a set of quickly adjustable collars to take up wear. The feed change box has steel gears throughout and changes from the roughing to the finishing cuts can be secured quickly. The mechanism of the change gearbox is also employed in thread cutting. The tailstock has a self-ejecting center and can be set over for turning tapers.

Coal-Mine Fatalities in 1916

The returns received by the Bureau of Mines, Department of the Interior, from the State mine inspectors, and compiled by Albert H. Fay, show that 1916 is a banner year in the low record of coal-mine fatalities in the United States. The decrease is about 3 per cent as compared with 1915, while the production of coal increased about 12 per cent. The number of fatalities reported during the year was 2225 as compared with 2269 for 1915. Figures are not yet available showing the actual number of men employed during the year, but on the basis of the number of men employed in 1915 the fatality rate was 3.03 in 1916 as compared with 3.09 per 1000 men employed in 1915. This is the lowest rate since 1898, when about one-half the number of men were employed.

Scientific Shop Management in the Senate

Senate Prohibits Scientific Management in Government Shops Despite the Testimony Given in Its Favor by Shop Managers

WASHINGTON, D. C., Feb. 10, 1917.—The reports concerning the effect of the abandonment of scientific shop management in the arsenals have been made a matter of public record through the incorporation in the Senate debate of extracts from testimony recently given by General Crozier, Chief of Ordnance, before the House and Senate committees engaged in the preparation of the fortifications and military appropriation bills. Replying to the question as to whether the abolition of the time study and premium system had interfered with the efficiency and economy of manufacturing arms and ammunition, General Crozier said:

Men's Output Fell Off when Premiums Stopped

I called on the Watertown Arsenal for a report as to the effect upon output which had been had by the legislation forbidding the payment of premiums since that legislation went into effect last summer, and I have received from the arsenal a report giving a number of instances in which the identical job had been done under the premium system and under the regular day-rate system. I will say that our method of paying these premiums was so adjusted that if a workman should do a piece of work in the time which had been ascertained to be reasonable, he received a premium which amounted to 33 per cent of his pay, in addition to his regular pay, and his regular pay was adjusted with reference to the rate in the vicinity for work of like character and for a man of like skill.

Now, there are reported here 49 instances, selected at random, of the same job done under the premium system of payment and under the regular day-rate system of payment, and in many cases, I think in about one-third of the cases, the jobs were done by the same man. Taking the first job which is mentioned in the list, which is a job of retapping the base of some 4.7-in. shells, a man last August did 100 of those shells in 10 hr. under the premium system of payment. As soon as he had finished that job, he was given the next day another 100 to do, but the second 100 were to be paid for out of funds appropriated in the act forbidding the payment of premiums, and to do the second 100 he took 22.95 hr. The first 100 were done in 10 hr. and the second 100, done immediately afterward, were done in 22.95 hr. That is to say, it took him 2.3 times as long to do the same amount of work under the day-rate system of payment as it took him under the premium system.

Being requested to present to the committee the "worst case" included in the tabulated report, General Crozier said:

The worst case which I have of a job done by the same man was a job of cutting a slot in 4.7-in. base plugs. A man did 100 of those in 2.66 hr. under the premium system, and then afterward he did 20, under the day-rate system, in 2.25 hr.; that is to say, it took 2.66 hr. to do 100, and it afterward took 2.25 hr. to do 20, one-fifth the number. It took 4.2 times as long to do one under the day-rate system as it took under the premium system.

Now Takes Over Twice as Long for a Job

The compilation submitted by General Crozier showed that in the machine shop at the Watertown Arsenal the average ratio of the times required to do the jobs observed since the abandonment of scientific management was 2.2 as compared with the times while the system was in use; in other words, it now takes more than twice as long to do a given job as it did while the premium systems were in force. The average ratio in the foundry was 1.6, that in the smithshop 2.1 and that in the yard gang 1.8, the average for the four departments being 1.92. That the loss of time is not the only unfavorable result is shown by the following extract from a report received by General Crozier from the officer in charge of the Watertown Arsenal:

It is perfectly evident by mere observation that a great change has taken place in our shops, the atmosphere that was so noticeable of industry and application has changed materially, there is much more loafing and a much greater

tendency to sit around on kegs, etc., than has existed here for several years, but I do not think any of us appreciated just how much the falling off had been until we had the data indicated on the tabulation which I am sending you. There is no doubt at all that the men have no desire now to exert themselves, and in one case which has recently been brought to my attention the machinist, when taken to task for doing such slow work, stated that now that the premium had been taken away, he did not propose to exert himself.

Replying to a question as to why workmen were not discharged when their performance fell so far below that attained under the premium system, General Crozier said:

After the premium system had been in operation at the Watertown Arsenal a year or more, we made some comparison of identical jobs done before the premium had been introduced and afterward, and we found that on an average the men did 2.7 times as much work when working under the premium system as they did when working under the day-rate system. Going back and using these records, we find that in the machine shop where most of these jobs recorded were done, the time required for doing the same job of work after the removal of the premium system averages 2.2 times as much as it had averaged for the same job under the premium system, which very closely agrees with the record when we first went up to the premium system. That is, performance went up and down in very much the same ratio.

Now, under the premium system we asked of every man his best effort, we measured that effort and we paid him extra for it. When we ceased to pay him for the better effort we lost the right to demand it. We now have not the right to demand anything more than what long experience has shown to be the average for the regular day wages. I give this as a reason why we do not at once discharge all these men. I do not think it would be fair.

Time Study and Premiums Defended

During the debate in the Senate on the fortifications bill the time study and premium systems were vigorously defended by Senator Townsend of Michigan, Senator Thomas of Colorado, Senator Oliver of Pennsylvania, Senator Smoot of Utah and others. Senator Thomas said impressively:

It seems to me that when the burdens of this Government are so exceedingly heavy, when the future looks so dark, and the necessity for military and industrial preparation seems to be so great, that politics ought not to enter into Government appropriations to compel the Congress to vote away the people's money in a reckless manner. If the premium system is abused or can be abused, it can be very readily corrected and controlled, because there is not a Senator or a Representative who would tolerate a system that would be inhumane to the men; but here is a system, as it seemed to me and, I repeat, as it seemed to a majority of the committee, that provided an incentive to the Government employees to do good work, to earn better wages, and to save the country a vast sum of money.

How Scientific Management Is Misrepresented

The task of defending on the floor of the Senate the prohibition of scientific management in the arsenals fell to Senator Hughes of New Jersey. In order that the manufacturers of the country may be able to appreciate the character of the statements that have been made in support of the prohibition and upon which it has been incorporated in one after another of the great appropriation bills until scientific management has been practically eliminated from all Government establishments, it is only necessary to quote a single paragraph from Senator Hughes's speech, as follows:

Do Senators know what a factory means that is run under premium conditions? I rather think not; but I will say this to you: The premium factories are the slaughterhouses of the country. The premium factories are the places where they grind up the fiber and the tissue of the children of this

country and turn them into dividends. The premium factories are the places where they hire pacemakers at severely advanced wages, where they give them dope, cod-liver oil, whisky, to keep them screwed up to a high pitch of performance, and then take the output of these men for the short period that they are able to make this output and try to raise the general level of the production of the shop to that standard. Why, anybody from an industrial town is familiar with it and knows exactly how it is brought about.

The object of these gentlemen is to make the human cog in their industrial enterprises perform up to the full limit of endurance all the time, taking into account nothing of the time before a man reaches his maturity or his ability to perform at the highest speed, and taking no account of him after he passes over the level and begins to descend; but so nearly as possible they want to eliminate everybody except the perfectly fit man and keep everybody straining and struggling to keep up to that standard of production. We can not stop that in private concerns, but we can stop it in factories and arsenals and navy yards that are controlled and operated by the United States Government, and we should stop it.

Senator Thomas challenged Senator Hughes to print in the *Congressional Record* the name of a single manufacturer in the United States who had ever resorted to the speeding up methods described but the Senator from New Jersey declined the challenge. Nevertheless, in spite of the knowledge which the great majority of the members of the Senate must have that there is no basis for such absurd statements as those made by Senator Hughes, the prohibition of scientific management was again permitted to be incorporated in the fortifications bill without the formality of a vote.

W. L. C.

Combustion Engineering Corporation's Growth

The Combustion Engineering Corporation, 11 Broadway, New York, announces the doubling of the size of its offices. This is due to the constantly increasing demand for its type E stoker for bituminous coal and Coxe stoker for anthracite. This enlargement of its offices takes in all of the Broadway front of the Bowling Green Building on the eighth floor, and with suites running back toward the Greenwich Street side.

The company has added considerably to its staff of draftsmen and engineers. It further announces the organization of six additional erecting units, each under the direction of a superintendent for field work, and the establishment of a service department under the direction of John Morris, who has been associated with the company since its organization. He will have a corps of competent engineers who will keep in constant touch with the trade with the idea of rendering customers free inspection and engineering service at all times. The company closed the past year with more than three times as much business as it had ever done in any one year before, and with orders booked for delivery far into the coming year.

Vanadium and Tungsten Exports Expanding

Ferrovanadium exports in November, 1916, were 345,957 lb. against 245,326 lb. in October. In November, 1915, they were only 9465 lb. The total to Dec. 1, 1916, was 1,767,012 lb. or over twice what they were to Dec. 1, 1915, when they were 743,796 lb.

Ferrotungsten exports in November, 1916, were 156,703 lb. as compared with 96,280 lb. in October and have continually risen in recent months. The total to Dec. 1, 1916, was 349,689 lb., valued at \$753,086.

The Kokomo Steel & Wire Company, Corrigan, McKinney & Co., the Republic Iron & Steel Company and the Allegheny Steel Company have recently adopted the Orth reinforced roof construction for their open-hearth furnaces, of which 25 are now building or lately completed.

The British Pacific Iron & Steel Company, Eburne, B. C., has placed an order for open-hearth furnaces for the steel plant the company will erect on the Fraser River, near Eburne. A site of 10 acres has been secured.

The Place of the Export Commission House

A meeting on the function of the export merchant and commission house was held on Jan. 25 in Pittsburgh preceding the convention on the following day of the National Foreign Trade Council. A session report has been made by Welding Ring, Mailler & Quereau, New York, and Wilfred H. Schoff, Commercial Museum, Philadelphia, chairman and secretary, respectively, of the conference. It is emphasized that the great run of standard products, more concerned with the home market than the foreign, are distinctly benefited by, and quite generally dependent upon, the export house for a foreign outlet.

The fairness of maintaining commission allowances on foreign business received through the stimulus of the export house, even if not actually transmitted through it, was recognized at the meeting. Co-operation between manufacturer and merchant through the promotion of foreign demand by traveling agents was declared to be always welcome, and the often-cited unwillingness of the commission house to disclose the destination of the goods was stated not to be in accord with the practice of reputable firms. It was the sense of those present that there is plenty of room for cordial co-operation with the export house, and that the number of manufacturers dealing direct will be relatively small in proportion to the total, and more or less variable according to fluctuations in home demand, and that the middleman is, and always will be, a very useful factor in the foreign commerce of the United States.

New Carpenter Steel Warehouse at Hartford

The Carpenter Steel Company, Reading, Pa., manufacturer of tool, high-speed and alloy steels, has closed contract for the erection of a modern steel storehouse and office along the main line of the New York, New Haven & Hartford Railroad at Hartford, Conn., adjoining the plant of the S K F Ball Bearing Company. The structure provided for includes a 12-foot platform the entire length of the building for loading and unloading. Work has been started and it is expected to have the building ready for occupancy May 1. To provide the company's customers with prompt service, its stocks of tool and high-speed steel, drill rods and alloy steel now carried at its present location will be more than quadrupled. Charles W. Olsen, who has been associated with the company in various capacities for over 20 years, will continue as New England sales manager, with offices at 189 Allyn Street, Hartford, pending the completion of the new quarters.

Building Up Foreign Credit Information

At a foreign credit conference held at the recent Foreign Trade Council convention in Pittsburgh, it was emphasized that though there are facilities at the present time for gathering credit information, there is not the system and order that prevails in the granting of domestic credits. It was the opinion of the conference that experience and information of the exporter cannot be regarded as an asset, to be held exclusively within his own enterprise. That was a theory in business a quarter of a century ago. When it was exploded there developed a domestic credit system. Information or experience are only assets as they are interchanged, for each unit given will bring many units in return. What is to happen will depend on the willingness of exporters to contribute what is necessary to the upbuilding of a foreign credit system. The conference report was submitted by C. E. Thomas, chairman, and J. H. Tregoe, secretary.

The Chicago Bearing Metal Company, 2220 West Forty-third Street, expects to have in operation by May 15 a 1½-ton, 270-kw. Rennerfelt electric furnace which it has just purchased from Hamilton & Hansell, New York, through Glen B. Hastings, 14 East Jackson Boulevard, Chicago. This will be the first Rennerfelt furnace to be installed in Chicago and will be used for melting composition copper.

ESTABLISHED 1855

THE IRON AGE

EDITORS:

GEO. W. COPE

A. I. FINDLEY

W. W. MACON

CHARLES S. BAUR, *Advertising Manager*

Published Every Thursday by the DAVID WILLIAMS CO., 239 West Thirty-ninth Street, New York

W. H. Taylor, *Pres. and Treas.*

Charles G. Phillips, *Vice-Pres.*

Fritz J. Frank, *Secretary*

M. C. Robbins, *Gen. Mgr.*

BRANCH OFFICES—Chicago: Otis Building. Pittsburgh:
Park Building. Boston: Equitable Building. Philadelphia:
Real Estate Trust Building. Cleveland: Guardian Building.
Cincinnati: Mercantile Library Building.

Subscription Price: United States and Mexico, \$5.00 per year;
single copy, 20 cents; to Canada, \$7.50 per year; to other
foreign countries, \$10.00 per year. Entered at the New York
Post Office as Second-class Mail Matter.

Edison at Seventy

To a very few has the ability or the opportunity been given of contributing to the material welfare of the entire world. Men have lived and others are now living whose names are known wherever grass grows and water runs, but too many of them have won such fame through deeds of blood or superlative cruelty to their fellows. The rewards of scientific achievements are of slow growth, and recognition by the masses is still slower. Warriors have won fame by a single campaign, while scientists who have placed all mankind in their debt have their names preserved only in encyclopedias.

But to Thomas A. Edison, who attained the age of 70 last Sunday, the civilized world has for many years enthusiastically acknowledged its indebtedness. And this acknowledgment has come while he is still living—not tardily, after his death. His inventive genius and his untiring application have been directed solely toward increasing the comfort or contributing to the convenience and pleasure of his fellow men.

Before his day the telegraph had come to be a necessity to the business world, but Mr. Edison multiplied its availability and cheapened its service by enabling four messages to be transmitted simultaneously over the same wire. Grasping the capabilities of electricity, he gave the world the incandescent lamp, enabling a whole community to light all its dwellings, factories and commercial establishments from a central station. Inventing the phonograph for the recording and reproduction of the human voice, he gave the business man the graphophone to quicken the dictation of correspondence. He has improved the telephone, made the moving picture talk and given us a storage battery of greatly increased potentiality. His activities have explored unrelated fields, such as the concentration of magnetic iron ore, the production of cement and the creation of cheap cement dwelling houses.

When the European war cut off our supply of dyes from coal-tar products, Mr. Edison turned his attention to the production of such necessities and demonstrated the possibility of America becoming independent of outside sources for these essentials for many industries. Physics and chemistry have acknowledged him as their master, and his many

almost incredible achievements in applied science have caused him to be dubbed "wizard." He has crowded into his 70 years so much of pre-eminent usefulness that he stands unique and incomparable.

National Efficiency

The present war is different from all others in the extent to which its prosecution is supported by the industrial operations at home. In no previous war have the belligerents organized their manufacturing and transportation industries so completely. This is not because efficiency has just been learned but because the circumstances of modern warfare have made this organization necessary. The cause is of no concern; it is the fact that is of importance. In another respect this war is different. Much more than in the average or typical war, this is one to preserve or develop commerce. It is not because men are more farseeing now than formerly that the Entente Allies have been considering in such detail what they will do commercially after the war; it is because this war is in particular a war of commerce. In one respect it is like other wars. As pointed out last month by the First National Bank of Boston, "more and more opinion is growing that" the war is, after all, a normal war, and will see "active business" during its continuance and "for several years after its termination."

In these circumstances it is quite certain that the warring governments will be as earnest and thorough in controlling their industries after the war as they have been during the war. At the close of our Civil War a million men returned to the pursuits of peace in the North without any disturbance in industry being occasioned, but the matter was left to chance while the present belligerent countries will not leave the matter to chance. Obviously, if for no other reason, the control of industry will be retained in order to assure that the return of soldiers to productive enterprise shall occasion no disturbance.

If there is no control or organization in the United States, then in respect to there being no control or organization here, and there being a complete system abroad, we shall be at a disadvantage. If the United States were completely neutral it would be a radical step for it to organize its industries in anything like the manner practised abroad

for the purpose of prosecuting and furthering its commerce. Already, however, the United States has made a step away from neutrality and is engaged in war preparations the precise object of which is not in doubt. The way is cleared for the country to organize its industrial operations for their most efficient operation. It needs no excuse for a country to prepare itself for defense or for it to prepare to conduct its commerce in better manner, but if the captious desire a clear reason, the reason is furnished.

At various times the hasty and obviously crude thought has been expressed that in case of the United States preparing for war the Government would find the machinery for making munitions of war ready at hand, already in operation. Since the matter has been seriously considered, no such thought obtains. The *Wall Street Journal* refers to such suggestions clearly and forcibly, saying in part of such suggestions: "They propose an entirely defensive campaign, with the accumulation of arms and armament solely for ourselves, to the exclusion of our present customers for such supplies, the Allies, upon whose side we should supposedly be fighting. Nothing could more effectually play into Germany's hands."

In other words, when all the belligerents have been making wonderful displays of efficiency, it would be national inefficiency of the most palpable description. The production of munitions should be increased, instead of the present production being diverted. If necessary, the steel needed should be secured by reducing the supplies of commercial steel now passing into strictly domestic consumption. That, however, would place hardships upon domestic consumers, and if means to avoid that can be found they should be employed.

The production of steel at present is at a rate less than the physical capacity of the plant facilities for the reason that transportation is inadequate. If freight transportation facilities are increased, the production of steel will be increased. The first step for national efficiency in war preparation, and a step that would conduce to greater trade after the war, would be for the Government to establish such control over the railroads and over the industries capable of supplying the railroads with additional facilities, particularly locomotives, as would increase the freight movement upon which the steel industry depends. The belligerent governments have gone far in discouraging passenger movement, practically forbidding it in some directions. Small steps in this direction would greatly improve the railroad situation in the United States, such as the annulment of passenger trains that are of lesser service to the people, reducing the speed of other trains, and so on. Individually the railroads cannot do these things, partly because they are in competition with each other as to the character of passenger service furnished and partly because would-be passengers would have ground for complaint to the Interstate Commerce Commission. A thousand more locomotives would greatly increase the freight movement of the railroad system, and it would be a small step for the Government to cause these locomotives to be furnished. These first few steps to-

ward national efficiency would mean much. Eventually the Government may have to take many and greater steps. The sooner the start is made the better.

Steel Export Classification

Quite a convenience would have been afforded if in the early months of the European conflict some one in authority had devised a nomenclature for the various classes of steel exported that are related in different ways to the war. We have the terms "shell steel," "munition steel," "war steel," "steel war orders," etc., but they are used loosely, not often capable of exact definition, and in any event do not cover the whole range of steel commodities that we are exporting because of the war and would not otherwise be exporting.

One result attending the lack of adequate terminology is that statements as to the proportion of our steel exports that are "war steel," or whatever term may be employed, while perhaps clear in the mind of the one making them, and also accurate, are misunderstood in many quarters. The term "shell steel" is perhaps precise, meaning steel from which shells are to be made. In the early stage of war business the preponderance ran to large rounds, over three-inch, but later the demand turned heavily to forging billets, for making large shells.

There is no question that the term "munition steel" has been misused. Indeed, the employment of the expression may as a rule be considered a misuse, for the word "munition" is too broad to be distinctive as applied to our steel exports. The leading definition of "munition" in Webster is "whatever materials are used for war," and as descriptive explanation there is mentioned "necessary equipment or provision in general." Such a war provision as double-tracking the Trans-Siberian railroad, or building the Russian road to Ekaterinen Haven would be a "provision in general," and the rails, locomotives, etc., involved could hardly be denied the appellation of "munitions." It is certainly not necessary that the commodity be used to shoot or be shot.

Still greater confusion arises from the fact that steel which might be described technically as purely commercial steel is being bought for export because of a shortage of such steel in Great Britain and France, the British and French steel works being diverted to the manufacture of shell steel. For instance, one export sale a few months ago involved a large quantity of sheets together with a heavy quantity of sheet bars. Specifications called for ordinary mild steel. Under normal conditions the buyer would have no occasion to make such a purchase, being a firm owning the largest sheet-rolling plant in England, with ample steel-making capacity to supply the sheet mills. While the purchase was of purely commercial steel, the materials were bought apparently because the plant that would ordinarily make such products was engaged in making shell steel.

Thus there are few clear lines of distinction that can be drawn, and the great bulk of our steel exports must be considered as owing to the war. Even our steel exports to neutrals could be regarded as

in a sense arising from the war, for previously a much larger quantity of steel was bought from the present belligerents by these neutrals than we have been furnishing them in the past two years.

In three important commodities the distribution of exports by destination is so given as to present a clear picture. The statistics follow:

Steel Exports, Eleven Months Ended November, 1916,				
Gross Tons				
	Unfinished	Steel	Plain and	
	Steel	Rails	Barb Wire	
United Kingdom....	234,674	.....	30,454	
France	832,575	.....	180,122	
Russia .....	.....	112,219	94,395	
Canada	96,216	35,577	57,547	
All other	182,361	351,428	290,023	
Total	1,345,826	499,224	652,541	

The 832,575 tons of unfinished steel sent to France was doubtless almost entirely forging billets or blooms for shell making, while the 234,674 tons sent to England probably included a considerable proportion of soft steel which would not have been needed if the British works had not been so busy making shell steel. Substantially the same observation applies to the 96,216 tons sent to Canada. If there were no war, Russia would probably be building railroads, though not so many miles, and it is unlikely the rail orders would have come to the United States. Of the wire exports, exclusive of those to Canada, one-half went to the Entente Allies and the other half to all other countries.

If it is desired to show that after the war our steel exports are likely to be large, the argument should proceed along the line that after the war a large demand for the steel will arise. No weight should be given to a contention that such will be the case because only a small portion of our present exports are of war steel. They are chiefly of war steel, giving a reasonable meaning to the term.

What is said above as to exports of the tonnage items of iron and steel exports applies with still more force to machinery, automobiles and railroad rolling stock. The great bulk of these exports are to the belligerents. Whether they are strictly to be designated as "munitions" or not, they are bought solely because there is a war.

CORRESPONDENCE

Lawmakers and Railroads

To the Editor: Having read your editorial comment on my letter, both published on the same page in the issue of Feb. 8, it is easily seen how the wording of the last paragraph of the letter has given the impression that relief from the situation described can be obtained by legislation. This, however, was far from my idea. The appeal of anybody, whether employer or employee, should be for a policy of "hands off" on the part of our legislators.

To the writer's mind, one of the most profound utterances on the part of any statesman in this country was that of Jefferson to the effect that "the country is best governed which is least governed." The idea which the paragraph referred to was intended to convey was that while the manufacturers and railroad managers have failed to convince our legislators that many of the laws which have been enacted are really more damaging than helpful, testimony to this same effect on the part of the employees might be more convincing.

One of the New York daily papers, the *Sun*, has

recently published editorials calling attention to the fact that even the most beneficial legislation which is now on the books entirely ignores the "development" of the railroads. Just what this covers has been best presented by the publicity department of one of the largest trunk lines. It sets forth what the population and industries along these lines will probably be twenty years from now, and at the same time presents a resumé of its present equipment. While no further comment is made, the contrast immediately suggests to the reader's mind the stupendous amount of work which must be done to keep the transportation facilities abreast of the country's development. H. D. M.

British Labor After the War

As a basis for negotiation between capital and labor during and after the war a special committee of the London Chamber of Commerce has made the following recommendations, from which it will be seen that emphasis is placed on compensating for individual results for recognizing living costs and encouraging profit sharing, premium and bonus payment systems, and the like:

As regards the remuneration of employees, the principle of payment by results should as far as possible be adopted by employers and employed.

The basis of rates of payment for labor should involve such a scale as will insure for all willing and efficient workers, a fair and reasonable standard of living.

The government should afford opportunities for considering the amendment of the trade disputes acts and of any provision of the factory and workshop acts other than those relating to the health of the workers.

Encouragement should be given, as far as possible, to profit-sharing and co-partnership agreements, or premium and bonus systems on lines which have proved beneficial to employers and employed in the past, subject to the special conditions of particular trades, and to the maintenance of the standard rates of wages.

Steel Corporation's Orders Decline Slightly

Unfilled orders on the books of the U. S. Steel Corporation at the close of business on Jan. 31, 1917, were 11,474,054 tons. This is a decrease of 73,232 tons from the total one month previous when they were 11,547,286 tons on Dec. 31, 1916. One year ago, Jan. 31, 1916, the total was 7,922,761 tons. The January statement is next to the largest in the history of the corporation. The following table gives the unfilled tonnage at the end of each month from January, 1914:

	1917	1916	1915	1914
January	11,474,054	7,922,767	4,248,571	4,613,680
February	8,568,966	4,345,371	5,026,440
March	9,331,001	4,255,749	4,653,825
April	9,829,551	4,162,244	4,277,068
May	9,937,798	4,264,598	3,998,160
June	9,640,458	4,678,196	4,032,857
July	9,593,592	4,928,540	4,158,589
August	9,660,357	4,908,445	4,213,331
September	9,522,584	5,317,618	2,787,667
October	10,015,260	6,165,452	3,461,097
November	11,058,542	7,189,489	3,324,592
December	11,547,286	7,806,220	3,836,643

The American Railway Association has compiled some statistics to answer charges to which the railroads have, especially lately, been subject. For the periods in the last 10 years when there have been car shortages, it figures that the losses in gross earnings to the railroads represent \$78,858,290 and for the periods of car idleness that the losses are no less than \$1,057,957,977.50. Thus in the one case the railroads lost because they did not have the cars and in the other because the shippers did not have the freight. The latter loss figures out at more than 12 times that due to car shortage.

The annual report of the Industrial Commission of Wisconsin, now on the press, will show that in 1916 there were 18,769 industrial accidents in the State, of which 15,382 were settled under the workmen's compensation law. In 1915 the number of claims was 10,758. The increase, the report says, is attributable to crowded factory conditions, overtime, larger working forces and the necessity of hiring inexperienced men. The 15,382 cases settled by the employers cost them \$1,057,433. In 1915 the 10,758 cases cost employers \$872,385.

Activity in Shipbuilding

WASHINGTON, D. C., Feb. 13, 1917.—Our shipbuilding industry now has work on hand aggregating more than 2,000,000 gross tons, an increase of more than 100 per cent over the corresponding date of last year. On Feb. 1 American private yards were building or were under contract to build 415 steel ships of 1,529,845 gross tons and 161 wooden vessels of 207,623 tons—a total of 576 vessels of 1,737,477 tons. Steel vessels building or ordered for the Navy and other Government departments at navy yards and private yards numbered 57, of 395,537 tons displacement, not including submarines. Details of the submarines are not published, but it is known that 61 are in course of construction, ranging from 400 to 1000 tons each, and averaging about 700 tons, which would give a total for this class of vessels of about 42,700 tons. The shipbuilding industry of the country accordingly now has work on

hand aggregating 694 vessels, of 2,175,714 gross tons. Included in the steel merchant ships building or ordered are 99, of 451,354 tons, building for foreign flags, mainly Norwegian; 37, of 122,730 tons, for the account of American builders, and 35, of 124,371 tons, for owners not stated. The names of the American owners of the remainder of these vessels have been reported to the Bureau of Navigation.

In January the American shipyards completed 10 steel merchant ships, of 47,769 tons, but during the same period took on new contracts to build 24 steel merchant vessels, of 77,830 tons. The indications are that February will show a larger output of steel vessels than January and that the new contracts will exceed launchings to such an extent as to cause a substantial increase in the work on hand. Including wooden construction, the total output of the private yards in January was 98 vessels, of 67,924 tons.

The accompanying table shows the number of steel vessels being built in the several shipyards both for the merchant marine and for the Government.

Shipyards	Merchant		Government	
	Number	Tons	Number	Tons
Albina Engine & Machine Works, Portland, Ore.	6	21,800	..	....
American Bridge Company, Ambridge, Pa., and Trenton, N. J. .	92	47,616	3	1,045
American Shipbuilding Company, Cleveland	19	67,700	..	....
Anderson Steamboat Company, Seattle, Wash.	2	11,400	..	....
Baltimore Dry Docks & Shipbuilding Company, Baltimore.....	10	34,245	..	....
Bath Iron Works, Bath, Me.....	1	906	6	6,772
Bethlehem Steel Company, Sparrows Point, Md.	14	89,317	..	....
California Shipbuilding Company, Long Beach, Cal. ....	..	....	5	*1,750
Chester Shipbuilding Company, Chester, Pa.	15	74,200	..	....
Clinton Shipbuilding & Repair Company, Philadelphia.....	1	560	..	....
Cowles Shipyard Company, Buffalo	1	36	..	....
Dubuque Boat & Boiler Works, Dubuque, Iowa	2	1,415	..	....
Fore River Shipbuilding Corporation, Quincy, Mass.....	12	79,904	41	*9,480
Great Lakes Engineering Works, Detroit	13	*55,000	..	....
Great Lakes Towing Company, Cleveland	2	196	..	....
Harlan & Hollingsworth Corporation, Wilmington, Del.	13	60,744	..	....
Howard Shipyards Company, Jeffersonville, Ind.	2	1,450	..	....
U. F. Duthie & Co., Seattle, Wash.	7	40,110	..	....
James Rees & Sons Company, Pittsburgh	3	590	..	....
Lake Torpedo Boat Company, Bridgeport, Conn. ....	..	....	16	†....
Manitowoc Shipbuilding Company, Manitowoc, Wis.	11	21,352	1	1,000
Merrill-Stevens Company, Jacksonville, Fla.	6	3,900	1	170
Moore & Scott Iron Works, Oakland, Cal.	6	30,600	..	....
Newport News Shipbuilding & Dry Dock Company, Newport News, Va.	13	91,673	3	97,200
New York Shipbuilding Company, Camden, N. J.	21	120,554	4	98,200
Pennsylvania Shipbuilding Company, Gloucester, N. J.	10	65,000	..	....
Pusey & Jones Company, Wilmington, Del.	12	11,850	1	360
Rice Bros. Company, East Boothbay, Me. ....	..	....	1	215
Ritter-Conley Company, Baltimore, Md.	2	3,000	..	....
Seattle Construction & Dry Dock Company, Seattle	10	57,500	5	*8,223
Skinner & Eddy Corporation, Seattle	9	52,910	..	....
Spedden Shipbuilding Company, Baltimore	5	1,645	..	....
Stacey Mfg. Company, Cincinnati. .	..	....	6	420
Standard Shipbuilding Corporation, New York City.....	8	38,000	..	....
Staten Island Shipbuilding Company, Port Richmond, N. Y.	6	12,800	..	....
Son Shipbuilding Company, Chester, Pa.	10	67,400	..	....
Tampa Foundry & Machine Company, Tampa, Fla.	1	2,000	..	....
Tank Shipbuilding Corporation, Newburgh, N. Y.	2	1,000	..	....
Texas Steamship Company, Bath, Me.	4	26,000	..	....
Toledo Shipbuilding Company, Toledo, Ohio	7	19,700	..	....
Union Iron Works Company, San Francisco	28	*175,028	6	7,110
Willamette Iron & Steel Works and Northwest Steel Company, Portland, Ore.	8	45,600	..	....
Wm. Cramp & Sons Ship & Engine Building Company, Philadelphia	9	60,700	2	2,242
Navy yards .....	..	....	14	*161,125
Other Government yards.....	..	....	2	225

*Tonnage incomplete. †Tonnage not stated.

In view of the extent to which American merchant vessels have been sold and transferred to foreign flags in the past two years, a bill which has been introduced in the House by Representative Alexander, chairman of the Committee on the Merchant Marine and Fisheries, and in the Senate by Senator Fletcher, chairman of the Committee on Commerce, which provides that when the United States is at war or during any national emergency, the existence of which is declared by proclamation of the President, no vessel registered or enrolled and licensed under the laws of the United States shall, without the approval of the Shipping Board, be sold, leased or chartered to any person or transferred to any foreign registry or flag. Any vessel sold or transferred in violation of this section is liable to be forfeited to the United States and persons violating this provision are subject to heavy penalties of fines and imprisonment. Amendments to this bill have been proposed, including all vessels now being constructed in American yards. It is also proposed that the President may take possession of all ships built in the United States upon payment of the "fair actual value" of vessels thus taken over.

W. L. C.

Bethlehem Contracts for Sparrows Point Plant

A contract has been awarded by the Bethlehem Steel Company to the Ritter-Conley Company, Pittsburgh, for the construction of the first two of the four blast furnaces to be built at Sparrows Point, Md. Contract for cranes, mixers, ladles, etc., as well as a 36-in. reversing slabbing mill and a 40-in. blooming mill, has been given to the Mesta Machine Company, Pittsburgh. These are roughing mills, and back of them will be 24-in. and 18-in. continuous mills. It is now being planned to add 166-in. plate mills and three continuous merchant bar mills. Electric power will be installed throughout the plant. In connection with the new blast furnaces, eight gas engines will be installed to drive the blowing apparatus.

Every effort is being made to rush the work in the marine department of the Bethlehem Steel Company, Sparrows Point, Md. The company is seeking more men so the work can be hurried. It is said that before long the yards hope to be able to turn out a ship a month.

Plans are being made for the construction of a blast furnace at Muskegon, Mich., to furnish metal to the local foundries. The proposed furnace is backed by outside capital and by some local interests, such as the Standard Malleable Iron Company, the Campbell, Wyant & Cannon Foundry Company and others.

The Lake Superior Corporation is installing three more 75-ton open-hearth furnaces at the plant of its subsidiary, the Algoma Steel Company, Sault Ste. Marie, Canada. Two of the new furnaces will be ready inside of two months. They will bring the daily capacity of the plant to 2000 tons of ingots.

Kitchin Revenue Bill in Senate

WASHINGTON, D. C., Feb. 13, 1917.—The Senate Finance Committee, with the approval of the Democratic Senatorial caucus, has completed the revision of the Kitchin revenue bill and the measure will be promptly taken up for passage in the Senate. While the bill, as reported, preserves the chief provisions of the House draft, it contains a number of important modifications. As approved by the Senate Committee, it is estimated to provide about \$350,000,000 additional revenue, of which \$100,000,000 will be obtained from a bond issue to pay for the armor-plate factory, the projectile plant, the nitrate producing establishment, the purchase of the Danish West Indies, the construction of the Alaskan railroad and other projects. About \$30,000,000 will be derived from increases authorized in the Federal inheritance taxes, leaving about \$220,000,000 to be obtained from Representative Kitchin's new project, the excess profits tax.

No scheme of taxation brought forward in Congress within the past decade has caused so much dissatisfaction throughout the country as the proposed tax on the excess profits of corporations and partnerships. Congress has been literally deluged with protests from every part of the country, and the Finance Committee has been obliged to devote several days to hearing the representatives of protestants who have pointed out not only the unwisdom of the proposition as a whole but the numerous incongruities, discrepancies and gross discriminations in the provision as drafted in the House bill. These protests, however, have fallen upon deaf ears.

The agitation against this extraordinary measure of taxation has not been without results, however, for although the Finance Committee has refused either to reduce the rate or increase the exemptions it has been forced to adopt an amendment equivalent to a declaration that the impost is a war tax or a preparedness measure by incorporating in the bill a limitation under which the tax expires automatically in four years. In deference also to the strong protests of munitions makers that they should not be compelled to pay both the special tax on war material imposed by the omnibus revenue act of Sept. 8, 1916, and the excess profits tax, the committee finally agreed to accept an amendment providing that the 12½ per cent tax on the profits of munitions makers shall cease in six instead of twelve months after the end of the European war.

The Webb Bill in Precarious Position

During the consideration of the revenue bill in the Democratic Senatorial caucus an incident occurred which reflects the extremely precarious position of the Webb bill legalizing export combinations. Senator Lewis of Illinois, the majority whip in the Senate, moved the addition of the Webb bill as a "rider," declaring that he was convinced, after a careful canvass of the Senate and consultation with the majority leaders of the House, that in no other way could it be enacted before the adjournment of Congress on March 4. Senator Lewis's motion would have commanded a large vote but for the protests of leading members of the Finance Committee who declared that the addition of the Webb measure would provoke extended debate in both houses and would imperil the passage of the revenue bill. The caucus therefore rejected Senator Lewis's motion, although it was made clear that the refusal to incorporate the Webb bill should not be construed as action adverse to the measure on its merits.

The policy of the minority of the Senate with respect to the revenue bill is indicated in an amendment to be urged by Senator Cummins, which proposes to increase the tariff rates of the Underwood-Simmons act by an amount which shall unquestionably be equal "to the difference between the general cost of production at home and abroad." The recently created tariff commission—which, however, has not yet been appointed by the President—is directed by the Cummins amendment to proceed as rapidly as practicable in an investigation to ascertain this difference in the cost of production, "giving such notice to domestic producers, middlemen and consumers as it may deem necessary in order to ob-

tain complete information." Senator Cummins's plan would make the findings of the tariff board operative not less than 30 and not more than 120 days after the duty or duties shall be prescribed by the tariff board.

A movement to change the rates of duty on tungsten ores and manufactures thereof is on foot. This project has taken shape in the form of a bill introduced in the House by Representative Timberlake of Colorado, prescribing duties as follows:

1. Crude tungsten, ores and concentrates, \$10 per unit of tungsten trioxid therein contained, a unit being herein defined as one per cent of tungsten trioxid in a short ton of 2000 lb.
2. Ferrotungsten powder, tungstic acid calcium, tungsten steel salts, and compounds of tungsten and all other manufactured materials containing tungsten, not especially provided for in this section, \$1.25 per lb. of tungsten contained therein.

Under the present tariff law ferrotungsten and tungsten metal are provided for at the rate of 15 per cent (paragraphs 102 and 110, schedule C) while tungsten-bearing ores of all kinds are covered by paragraph 633 of the free list.

W. L. C.

Improvements in Hot-Blast Stove Construction

In discussing the construction of hot-blast stoves in a paper to be presented to the coming meeting of the American Institute of Mining Engineers in New York, it is suggested that the heat conservation and life of a stove may be improved by using several kinds of brick. One type which is a good insulator of heat could be used for lining the stove and for making partitions through the stove. Another type should be brick or material of high refractory qualities. The third should be a good conductor of heat.

The authors, Linn Bradley, H. D. Egbert and W. W. Strong, chief engineer, engineer in charge of the commercial department and physicist respectively of the Research Corporation, New York, contend also that the combustion air could be preheated by means of the stove exit gases. It is not necessary, they hold, to employ as expensive a method as is needed for preheating the blast of the furnace. They would provide a heat-exchanging apparatus placed above the stove, the preheated air being delivered to the stove burners by means of a fan and duct. A higher efficiency of absorption, they emphasize, can be obtained in a stove when the flame temperature is high; that the exit gases will be only slightly, if any, higher, and that the great advantage to be obtained by preheating the combustion air and by hot-dry cleaning of the gases will be the ability to get a hotter blast in the same length of time, thus improving the ratio of "time on wind" to "time on gas."

Shipbuilding in China

Consul General Goerge E. Anderson, Hongkong, makes the following report on shipbuilding in that Chinese city:

"Much of the activity in shipbuilding has been in the construction of vessels for the Singapore-Bangkok trade and for other similar services in that part of the world formerly maintained by German steamers. One of the large yards, the Taikoo Shipbuilding & Engineering Company, has recently completed a steamer 250 ft. long and one of 225 ft. for this trade. The same yard has under construction two steamers 223 ft. long for the Siam Steamship Company, and two steamers 291 ft. long for Jardine Matheson & Co. for the China coasting trade, and four steamers 270 ft. long for Norwegian owners. The Hongkong & Whampoa Dock Company has recently completed the Kajang and the Kamuning, each 2077 tons, and the Kepong of 1910 tons for the Straits Steamship Company and Sunning of 2550 tons for China Navigation Company. This yard is building the Suiyardg of 2550 tons; the Woosung, 3450 tons, for the China Navigation Company, and two vessels each of 6200 tons for Alfred Holt & Co. Remodeling of several large vessels has been completed. A large part of the material comes from the United States."

NEW BETHLEHEM GUN SHOPS

For Making 16-In. Army and Navy Guns—To
Cost \$5,000,000

With the advent of the 16-in. 50-caliber guns designed by the United States Army and Navy for coast fortifications and on battleships, new problems, due to increased size of ingots, annealing, tempering, shrinking and machining facilities, have been imposed upon the manufacturer. To meet the manufacturing requirements of the guns, the Bethlehem Steel Company in its Lehigh plant, South Bethlehem, Pa., is taking the necessary steps in its open-hearth department to produce ingots weighing, including discard, approximately 150 tons for the larger size tubes or jackets intended for these guns. The manufacture of these ingots requires especially large ingot molds and handling facilities. To take care of the physical properties of the steel, an annealing and heat-treatment department, equipped with nine large annealing and heat-treating furnaces, varying in size from 24 ft. to 90 ft. in length and 8 ft. in width, is about to be installed, with the necessary oil and water baths, straightening presses, pumps, etc. The building for housing this equipment is approximately 95 ft. by 460 ft., abutting a building 115 ft. wide by 240 ft. in length, housing the furnaces proper.

The assembling of these huge guns presents an unusual proposition, requiring a crane of 175 tons capacity to lift the combined weight of gun. The heating for oil tempering and shrink fits for gun assembly will be accomplished in a vertical furnace approximately 90 ft. in depth. An oil tank of the same depth is also required. The building for this work will be 165 ft. in height, with furnaces, tanks, shrinkage pits, etc., extending 55 ft. below grade, to accommodate the guns, which, during operations of heating, oil tempering, shrinking, etc., are handled in vertical plane. The fuel gas for the furnaces is brought from the Lehigh Coke Company's plant at 6-lb. pressure through a 42-in. main, which has just been completed. This main is 11,000 ft. in length, and the gas is forced through by pressure boosters located near the coke plant.

For machining and rifling the guns a machine shop 180 x 700 ft. will be required to turn out two of the larger size guns per month. An idea of the size of the machines required can be had from the statement that the boring machines for tubes and liners will be 195 ft. in length by approximately 12 ft. in width.

The total expenditures involved due to the new construction will be in the neighborhood of \$5,000,000.

Work has been started and will be pushed to completion as rapidly as possible. Contracts for the grading, foundations, buildings and machinery, and auxiliaries have already been let. The new departments will cover approximately 5 acres of ground, with a trackage system covering about 2 acres or more. All departments will be equipped with washing facilities for employees, including shower baths, locker rooms, etc. These new divisions of the works will give employment to about 400.

R. B. Dumville, formerly inspector of the Gatun locks of the Panama Canal, and later connected with the McClintic-Marshall Company, Pittsburgh, on the installation of tunnel shields at New York, has signed a contract with the Japanese Government to install gates and operating machinery at the entrance of the harbor of Chemulpo, Korea. These lock gates were furnished some time ago by the McClintic-Marshall Company, and required about 1000 tons of steel.

The Anniston Steel Company, Anniston, Ala., is installing the first of three new electric steel furnaces, and it will be in operation in a few days, the other two to follow as rapidly as possible. These furnaces will give the plant six electric furnaces in all, placing it among the largest in the country. The output is largely consumed by the Anniston Ordnance Company in the manufacture of shells for the French Government.

CONTENTS

The Way to Win Trade in Russia.....	421
Treating High-Speed Steel	425
Making the Executive More Efficient.....	426
Tata Iron & Steel Earnings	427
Weldless Steel Tires.....	428
The Standard Pipe Receivership	428
American Steel Foundries' Year.....	428
Mazling Machine for Threading Dies.....	429
A Two-Prong Electric Soldering Iron.....	429
Temperature Measurements in Steel Making.....	430
A Nut Lock with Special Washers.....	431
Chipping Guard Used in National Tube Works.....	431
Hardness Tests for Steel.....	432
Bearings in Steel Mills	433
Federal Export Corporation's Growth.....	433
Bethlehem Steel Acquires Lehigh Coke Company.....	433
Crucible Tool Steel	434
Hill Clutch Company Efficiency Meeting.....	434
Waste Heat Utilization	435
A 12-In. Lathe for Light Toolroom Work.....	437
Coal-Mine Fatalities in 1916.....	437
Scientific Shop Management in the Senate.....	438
Combustion Engineering Corporation's Growth.....	439
Vanadium and Tungsten Exports Expanding.....	439
The Place for the Export Commission House.....	439
New Carpenter Steel Warehouse at Hartford.....	439
Building Up Foreign Credit Information.....	439
Editorials:	
Edison at Seventy.....	440
National Efficiency	440
Steel Export Classification	441
Correspondence	442
British Labor After the War.....	442
Steel Corporation's Orders Decline Slightly.....	442
Activity in Shipbuilding	443
Bethlehem Contracts for Sparrows Point Plant.....	443
Kitchen Revenue Bill in Senate	444
Improvements in Hot-Blast Stove Construction.....	444
Shipbuilding in China	444
New Bethlehem Gun Shops.....	445
Personal	446
Whitaker-Glessner Company's Annual Meeting.....	447
Progress of Naval Bill.....	447
Iron and Steel Markets	448
Finished Iron and Steel Prices, Pittsburgh.....	460
Metal Markets	461
Pittsburgh and Nearby Districts	462
Wharton Steel Company Organization.....	463
Youngstown Iron & Steel Company Changes.....	463
Louisville Steel & Iron Company in Operation.....	463
Obituary	463
Iron and Industrial Stocks	463
To Push Construction Machinery Exports.....	464
Union Switch & Signal Plant Burned.....	464
Chandler & Farquhar Business Divided.....	464
Steel Foundries in Chester District Expanding.....	464
Annual Meeting of American Brass Company.....	464
Machinery Markets and News of the Works.....	465
Judicial Decisions	471
New Trade Publications	472
Swedish Electric Pig Iron and Steel.....	472

Putnam & Co., manufacturers of rolling, step and extension ladders and overhead tracking and dealers in door hangers, hardware specialties, doors, etc., will remove on or before April 1 to a new building at 32 Howard Street, New York City. The entire building, which is about three times the size of the firm's present quarters at 244 Water Street, will be occupied.

PERSONAL

John C. Williams, formerly assistant to E. T. Weir, president Phillips Sheet & Tin Plate Company, Weirton, W. Va., has been elected third vice-president of the company, in charge of the operating department. He has been connected with this company since it was incorporated about 11 years ago.

R. J. Kaylor, publicity manager of the Youngstown Sheet & Tube Company, delivered an address last week to the pupils and faculty of the Central High School, Binghamton, N. Y., describing the process of steel making, and in the evening addressed members of the Chamber of Commerce, students of the night schools and others on the same subject.

E. W. Pargny, president American Sheet & Tin Plate Company, Pittsburgh, has gone to Palm Beach, Fla., to remain until about March 10. Fred M. Fuller, assistant to the general sales manager of the same company, has gone to Camden, S. C., on a vacation.

George Mesta, president Mesta Machine Company, Pittsburgh, has gone to Palm Beach, Fla., on a wedding trip.

The Harry Benjamin Equipment Company, St. Louis, dealer in old material, announces the association with the company as its vice-president of Armand Alexandre, who until recently has been the St. Louis representative of the Ohio Iron & Metal Company.

The Modern Tool Company, Erie, Pa., grinding machines and threading tools, announces the acquisition of H. L. Harrison to its mechanical staff in the capacity of factory manager. His previous connections have been with the Packard Motor Car Company, the Maxwell Briscoe Company and the American Car & Foundry Company. For many years he has been engaged in factory supervision and tool design.

Maurice Langhorne, who has been connected with the Pulaski Iron Company, Pulaski, Va., for several years as superintendent of the blast-furnace department, has resigned. While connected with this company he made an excellent record as a furnaceman.

J. S. Green, master mechanic for the Franklin Steel Works of the Chicago Railway Equipment Company, at Franklin, Pa., has resigned. Elmer Kechler, chief engineer, has been appointed master mechanic to succeed him. Mr. Green goes to the Wickwire Steel Company, Buffalo, to aid in the installation of its new plant.

Oglebay, Norton & Co., Cleveland, have issued a formal announcement that H. K. Bourne, who has been connected with their ore sales department for a number of years, has become a member of the firm.

Pickands, Mather & Co., Cleveland, have taken in as members of the firm William McLauchlan, head of their pig-iron sales department, George H. Beaumont, the firm's iron-ore and blast-furnace expert, and George D. Cameron, of the coal sales department.

Allan J. Beaton, president and manager of the Beaton & Cadwell Mfg. Company, New Britain, Conn., has sold his interest to William H. Cadwell and others. He first engaged in the manufacturing business in New Britain and then organized the Beaton & Corbin Company, Southington. Later he sold his interest in that company and organized the Beaton & Bradley Company, Plantsville. Later the Beaton & Cadwell Company was organized and started the plant in the rear of 169 Main Street, New Britain. The business has prospered and a new plant is in process of erection.

David S. Cann, of Cann & Saul, dealers in iron and steel, 516 Commerce Street, Philadelphia, Pa., formerly with the Brylgon Steel Casting Company, will be made a member of the executive committee of the Deemer Steel Casting Company, New Castle, Del.

C. W. Lutz, who has been in charge of the American Steel & Wire Company's mill at Fairfield, Ala., has been transferred to Pittsburgh, where he becomes assistant manager of several of the company's plants.

W. D. Sayle, president Cleveland Punch & Shear

Works Company, Cleveland, has gone to California to remain until April.

E. W. Tutwiler, formerly general superintendent of the Tata Iron & Steel Company, Sakchi, Bombay, India, has been made general manager of the entire plant.

Norton H. Anderson, superintendent of manufacture of the Bethlehem Steel Company, South Bethlehem, Pa., has resigned, and will take a much-needed rest before engaging in any new work.

C. M. Garland, widely known in connection with steam and gas power engineering, has been appointed in charge of the power department of the Allen & Garcia Company, consulting and constructing engineer, McCormick Building, Chicago.

George L. Danforth, South works, Illinois Steel Company, has been given the general supervision of all steel making at that plant, including the open-hearth, duplex and Bessemer departments, adding to his former duties those that were under the direction of Thomas Moore, resigned.

The readjustment at South works, Illinois Steel Company, following the appointment of P. A. Newton as general superintendent, succeeding Mr. Field, includes H. A. Brassert, who succeeds Mr. Newton as assistant general superintendent; W. Mathesius, who succeeds Mr. Brassert as superintendent of blast furnaces; Mr. Touzalin, who succeeds Mr. Mathesius as assistant superintendent of blast furnaces; W. S. Hall, who succeeds Mr. Tschentscher as electrical engineer; Mr. Herman, who succeeds Mr. Medalie as secretary to the general superintendent.

The United Furnace Company, Canton, Ohio, has retained B. R. Shover, Diamond Bank Building, Pittsburgh, as consulting engineer on the operation of its entire power equipment.

Myron C. Wick, Jr., formerly with the Trumbull Steel Company, Warren, Ohio, will sail for Europe this week to join the American ambulance corps in France.

H. A. Rapelye, Pittsburgh representative of the Terry Steam Turbine Company, Hartford, Conn., has been elected chairman of the mechanical section of the Engineers' Society of Western Pennsylvania.

The McKinley Memorial Building at Niles, Ohio, will be dedicated May 5, instead of May 30, as first planned. President Wilson and ex-President Taft have signified their intention of being present if possible. The money to defray the cost of building this memorial was raised largely through the efforts of J. G. Butler, Jr., Youngstown, Ohio.

The Locomobile Company of America announces the resignation of Claude C. Ostrom, purchasing agent, effective Feb. 15. He leaves Bridgeport to become associated with the Parish Mfg. Company of Reading and Detroit, located at Detroit, in an executive capacity. The Parish Company is one of the foremost automobile frame manufacturers in this country, making frames for the Locomobile Company and other high-grade automobile builders. J. E. Forgy, present assistant purchasing agent, will succeed Mr. Ostrom as acting purchasing agent Feb. 15.

John C. Jay, Jr., who resigned a short time ago as chairman of the board of directors of the Maxwell Motor Company, Detroit, has retired from the board.

W. Jacobus, former expert in old material for the U. S. Navy Department, has become associated with the Salvage Disposal Corporation, 295 Church Street, New York, in buying non-ferrous scrap metal and condemned stores, besides doing expert work for corporations desiring his services.

The Birmingham Machine & Foundry Company, Birmingham, Ala., states that its president, Dr. R. W. Boland, has sold his entire interest and good will in the company. The following officers have been elected for this year: George M. Morrow, Jr., president; R. I. Ingalls, vice-president; Robert Ritchie, secretary and treasurer. The company manufactures cane-sugar mills and crushers, Corliss engines, pans, heavy castings, etc.

Edward M. Brown, plant engineer of the wrought pipe mills of the A. M. Byers Company, Columbia, Pa., has been appointed superintendent, to succeed Frederick

Mack. S. J. Smith, Toledo, Ohio, has been appointed plant engineer.

John D. Ball, Schenectady, N. Y., late of the consulting engineering department, General Electric Company, and assistant to Dr. Charles P. Steinmetz for nine years, has accepted the appointment of professor of electrical engineering, School of Engineering, Milwaukee, Wis. He is a graduate of the University of Illinois and a member of the American Institute of Electrical Engineers.

Whitaker-Glessner Company's Annual Meeting

The annual meeting of the Whitaker-Glessner Company was held in Wheeling, W. Va., Feb. 7. The report of operations for 1916, made by Alexander Glass, president, showed that after deducting the entire expenses of the company's bond issue and providing adequately for property and other depreciation, the net earnings were \$4,868,656.27. From this, dividends totaling \$442,638 were paid. During the year the company's reserves increased \$1,689,386.40. In the total reserves there is carried \$2,024,502.98 of contingent profits to provide against shrinkage of materials on hand and under contract.

The old board of directors, consisting of Alexander Glass, E. C. Ewing, A. C. Whitaker, H. C. Whitaker, N. P. Whitaker, D. H. Wagner, W. H. Abbott, G. B. Glessner, Louis Gutman, Joseph Coudon and Andrew Glass, was re-elected. Alexander Glass was elected chairman of the board; Andrew Glass, president; E. C. Ewing, A. C. Whitaker and N. P. Whitaker, vice-presidents; G. W. Hocking, secretary and treasurer; George P. Whitaker, assistant secretary.

The annual dinner of the Worcester, Mass., section of the American Society of Mechanical Engineers was held in the Bancroft Hotel Feb. 8. The principal address was by Charles H. Norton, Norton Grinding Company, on "The Introduction of Cylindrical Grinding and Worcester's Part in the Development of the Art." This was one of a series of talks which form the winter program of the section and which are designed to cover some of Worcester County's contributions to mechanical engineering. President Ira N. Hollis was to have been a speaker but was detained in New York at a meeting of the Engineering Council. He sent a letter which was read by Paul B. Morgan, chairman.

The New Haven Branch of the National Safety Council held a conference at New Haven, Conn., Jan. 30, which was largely attended by manufacturers from nearby industrial centers. Prof. L. B. Breckenridge and Prof. Joseph W. Roe, Sheffield Scientific School; Earle B. Morgan, Norton Company, Worcester, Mass.; F. H. Carroll, American Steel & Wire Company, Worcester; Marcus A. Dow, general safety agent of the New York Central Railroad, and C. W. Price, field secretary of the National Safety Council, were among the speakers.

The Warren Foundry & Machine Company, Phillipsburg, N. J., re-elected the directors and officers at the annual meeting held Monday, Feb. 12. The directors are William H. Hulick, A. D. Chidsey, E. J. Fox, Chester Snyder, W. C. Hackett, Lee F. Clymer and William H. Walter. The president and treasurer is William H. Hulick; vice-president and assistant treasurer, A. D. Chidsey, A. L. Reilly; superintendent, S. B. Brown.

Bertsch & Co., Cambridge City, Ind., have completed for a Chicago company a bending press, designed to bend any plate used in the manufacture of cars, and said to be the heaviest machine of its type so far built in this country. Its dimensions are 20 x 23 ft. One casting in the machine weighs 20 tons. Each of the main gears is 11 ft. in diameter and weighs 8000 lb.

C. W. Wiley, president and manager of the Seattle Construction & Dry Dock Company, Seattle, Wash., has been appointed agent for the Todd Dry Dock & Construction Company, New York, which is constructing a shipbuilding plant in Tacoma, Wash.

Progress of Naval Bill

WASHINGTON, D. C., Feb. 13.—With the aid of a special order from the Committee on Rules, the House Committee on Naval Affairs succeeded in forcing into the naval appropriation bill, passed to-day, a modified draft of the amendment framed by Attorney-General Gregory at the instance of Secretary Daniels, giving the President authority to commandeer shipyards and munitions plants "in time of war or national emergency." The committee, however, abandoned the provision of the original amendment authorizing the draft of the officials and employees of such establishments. The committee also abandoned the amendment introduced last week by Chairman Padgett, appropriating \$150,000,000 to enable the President to hasten the construction of the naval building program, and some other method of providing the necessary funds will be attempted.

The solution of the problem presented by the inability of the Navy Department to secure bids for the four battle cruisers and three of the four scout cruisers authorized by Congress last session is believed to have been provided in the bill which, as passed by the House, increases the cost limit for the battle cruisers from \$16,500,000 to \$19,000,000 each and that of the scout cruisers from \$5,000,000 to \$6,000,000 each.

That the Naval Committee appreciates the position of the private shipyards and does not sympathize with Secretary Daniels's desire to allot all naval construction to the navy yards is evidenced in a provision of the naval bill inserted after the shipbuilders had been heard in their own defense. Secretary Daniels had urged an additional appropriation of \$12,000,000 to be made immediately available for the equipment of the navy yards for the construction of the entire building program, from battle cruisers to submarines, but the committee in appropriating the desired amount couples it with the stipulation that it shall be expended only "in the event the Secretary of the Navy is unable to secure from the private shipbuilders contracts for the expeditious construction of the ships heretofore authorized at a fair and reasonable price."

In addition to increasing the cost limit for the 7 big vessels authorized last year, the naval appropriation bill provides for the construction of 3 battleships at \$15,500,000 each, 1 battle cruiser at \$19,000,000, 3 scout cruisers at \$6,000,000 each, 15 destroyers at \$1,300,000 each, 1 destroyer tender at \$2,300,000, 18 coast submarines of about 800 tons displacement at \$1,300,000 each, and 1 submarine tender at \$1,900,000. The total cost of this program, including armor, armament and ammunition, is \$188,537,000, or more than one-half the total amount carried by the pending bill, which is \$351,453,000, a reduction from the Department's estimates of \$42,087,000. In anticipation of the passage of the appropriation bill Acting Secretary of the Navy Roosevelt announces that proposals for constructing by contract the 3 scout cruisers appropriated for in this bill and the 3 similar vessels provided for last year but not yet contracted for will be received at the Navy Department until noon on Wednesday, March 14.

Concerning the construction of the vessels authorized by the pending bill it is provided that the Secretary of the Navy may cause any of them to be built in such navy yards as he may designate and he is directed to have them all built in the navy yards "should it reasonably appear" that bidders have entered into any combination or understanding. The bill provides that the large battle cruiser included in the construction program may be built by contract on a basis of cost-plus-profit "if in the judgment of the Secretary of the Navy the most rapid and economical construction can be obtained thereby." It is also stipulated that no part of the sum appropriated shall be expended for the purchase of material from parties to any existing combination or conspiracy to monopolize the interstate or foreign commerce or trade of the United States, "and no purchase of structural steel, ship plates, or machinery shall be made at a price in excess of a reasonable profit above the actual cost of manufacture: but this limitation shall in no case apply to any existing contract."

W. L. C.

Iron and Steel Markets

PRODUCTION CURTAILED

Cold Weather Affects Finishing Mills

Advances in Pig Iron, Pipe, Sheets and Coke—
Rails Sold for Fourth Quarter of 1918

Cold weather has added to the trials of insufficient cars and locomotives and, gaged roughly, 25 per cent of the producing capacity of the Central West in pig iron and semi-finished and finished steel is idle. About 30 blast furnaces of the Steel Corporation are banked and more may follow. The industry cannot push out product against lines of standing loaded cars nor can it get steady inflow of materials if empty cars do not reach sources of supply.

In a word, the railroad situation is all absorbing. It is developing a pronounced spot market, particularly in pig iron. Prices on most grades of iron have been advanced; 50c. per ton in some markets and \$2 on foundry iron in Pittsburgh, where there has been a spread between prompt and future of fully \$5. Basic alone has not responded, domestic sales bringing a shading of \$30 at Valley furnace, but the general falling off in production is regarded as a check. Export purchases of basic include 20,000 tons for Italy at \$32 to \$32.50, seaboard, for April delivery, and 5000 tons at \$31, Valley furnace.

Steel consumers are concerned over the uncertainties of deliveries and increasing activity in negotiations for second-half buying is noted. The expanded Government naval program, adding three more battleships, one battle cruiser, fifteen destroyers and eighteen submarines, makes a disturbance of mill delivery schedules more likely. Prices are naturally sensitive, and the next two or three months curtailment in output is calculated to hold, if not to stiffen, present levels through the second half and possibly through the entire year.

Some advances must be recorded this week. Black and galvanized iron and steel pipe, including oil country goods and line pipe, are now \$4 per ton higher, as forecasted last week. On the withdrawal of the American Sheet & Tin Plate Company for any new business up to July 1, prices were advanced \$5 per ton by other sheet makers on blue and box annealed sheets. Tin plate, for which the demand is insatiable, is moving for 50c. more per box on current orders.

Ore shipments from Lake Erie docks to furnaces in January were 686,277 tons, which is 201,149 tons, or 22½ per cent, less than the shipments of January, 1916. While the reduced movement is at-

tributable in part to car shortage, stocks at furnaces were larger at the close of the navigation season than was the case a year before. The stocks on the docks on Feb. 1 were 9,118,926 tons, which is 2,047,651 tons greater than the dock supply on Feb. 1, 1916, and it is expected that on April 1 there will be more ore available at Lake Erie ports than on the same date in 1916.

Rails have now been sold for delivery in the fourth as well as the third quarter in 1918, such sales for Southwestern roads involving 45,000 tons. Some 25,000 tons for other roads have also been closed for like delivery.

Car builders and locomotive shops have placed upward of 50,000 tons in bars, shapes and plates at Pittsburgh for the last quarter of this year and the first quarter of 1918, and 100,000 tons is pending. The week's largest industrial plant expansion offering is for the Studebaker automobile factory. It may involve 10,000 tons of structural steel, though the initial inquiry is for 2500 tons.

France, as well as England, is now seeking boats. Besides trying for existing ships, negotiations are under way to take over contracts for ships under construction. It is believed that six have already been bought and new contracts have been placed, contingent solely on securing the material. Three of the new ships are to be built in San Francisco. For oil tanks in Mexico some 7500 tons in plates is wanted.

So far the Government's purchases outside of shapes for navy yard buildings cover only large shells. A domestic shell maker has been sounding the market on 2000 tons of shell steel billets for March and April.

Pittsburgh

PITTSBURGH, PA., Feb. 13, 1917.

The shortage of fuel is now a dominant factor in the iron and steel trades. The United States Steel Corporation, as a whole, has about 30 blast furnaces banked, and others will likely go out this week. One of its subsidiaries, the National Tube Company, has two out of five blast furnaces at Lorain, Ohio, banked, and the steel plant and finishing mills are idle. The Pennsylvania works of this company in the Pittsburgh district is also down, being unable to get coal. It is a safe estimate to state that probably 25 per cent of capacity in pig iron, semi-finished steel and finished material in the Central West is idle to-day on account of lack of fuel and shortage of cars and motive power. The car situation is steadily getting worse, and embargoes are on in every direction. The railroads have completely fallen down, and say they cannot begin to take care of the business offered them. This is largely on account of lack of cars and men, but the shortage of motive power is more serious, as hundreds of cars are loaded in the Pittsburgh district waiting for locomotives to move them. The situation is much the

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton:	Feb. 14, 1917.	Feb. 7, 1917.	Jan. 17, 1917.	Feb. 16, 1916.
No. 2 X, Philadelphia....	\$31.50	\$31.00	\$30.00	\$20.00
No. 2, Valley furnace....	33.00	31.00	31.00	18.25
No. 2 Southern, Cin'ti....	26.90	26.90	25.90	17.90
No. 2, Birmingham, Ala....	24.00	24.00	23.00	15.00
No. 2, furnace, Chicago*	32.00	30.00	30.00	18.50
Basic, del'd, eastern Pa....	30.50	30.50	30.00	19.50
Basic, Valley furnace....	30.00	30.00	30.00	17.75
Bessemer, Pittsburgh....	35.95	35.95	35.95	21.45
Malleable Bess., Ch'go*....	32.00	31.00	31.00	19.00
Gray forge, Pittsburgh....	31.95	29.95	29.95	18.45
L. S. charcoal, Chicago....	33.75	33.75	31.75	19.75

Rails, Billets, etc., Per Gross Ton:	Feb. 14, 1917.	Feb. 7, 1917.	Jan. 17, 1917.	Feb. 16, 1916.
Bess. rails, heavy, at mill	38.00	38.00	38.00	28.00
O.-h. rails, heavy, at mill	40.00	40.00	40.00	30.00
Bess. billets, Pittsburgh.	65.00	65.00	65.00	33.00
O.-h. billets, Pittsburgh.	65.00	65.00	65.00	35.00
O.-h. sheet bars, P'gh....	65.00	65.00	65.00	35.00
Forging billets, base, P'gh	85.00	85.00	80.00	55.00
O.-h. billets, Phila.....	60.00	60.00	60.00	42.00
Wire rods, Pittsburgh....	75.00	75.00	75.00	50.00

Finished Iron and Steel, Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Iron bars, Philadelphia...	3.159	3.159	3.159	2.409
Iron bars, Pittsburgh....	3.25	3.25	3.25	2.15
Iron bars, Chicago.....	3.00	3.00	3.00	1.90
Steel bars, Pittsburgh....	3.25	3.25	3.25	2.25
Steel bars, New York....	3.419	3.419	3.419	2.669
Tank plates, Pittsburgh.	4.75	4.75	4.50	2.50
Tank plates, New York...	4.919	4.919	4.669	2.919
Beams, etc., Pittsburgh..	3.25	3.25	3.25	2.00
Beams, etc., New York...	3.419	3.419	3.419	2.169
Skelp, grooved steel, P'gh	3.25	3.25	2.85	2.00
Skelp, sheared steel, P'gh	3.50	3.50	3.00	2.10
Steel hoops, Pittsburgh..	3.50	3.25	3.25	2.25

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Sheets, Nails and Wire, Per Lb. to Large Buyers:	Feb. 14, 1917.	Feb. 7, 1917.	Jan. 17, 1917.	Feb. 16, 1916.
Sheets, black, No. 28, P'gh	4.75	4.50	4.50	2.60
Sheets, galv., No. 28, P'gh	6.50	6.25	6.25	4.75
Wire nails, Pittsburgh....	3.00	3.00	3.00	2.30
Cut nails, Pittsburgh....	3.70	3.50	2.95	2.20
Fence wire, base, P'gh....	2.95	2.95	2.95	2.15
Barb wire, galv., P'gh....	3.85	3.85	3.85	3.15

Old Material, Per Gross Ton:	Feb. 14, 1917.	Feb. 7, 1917.	Jan. 17, 1917.	Feb. 16, 1916.
Iron rails, Chicago.....	\$27.00	\$27.00	\$27.00	\$17.25
Iron rails, Philadelphia...	28.00	28.00	28.00	19.50
Carwheels, Chicago.....	18.00	18.50	19.00	13.75
Carwheels, Philadelphia..	20.50	20.50	21.50	16.50
Heavy steel scrap, P'gh...	22.00	22.00	22.00	17.00
Heavy steel scrap, Phila..	20.00	20.00	22.00	16.50
Heavy steel scrap, Ch'go.	21.75	21.25	21.00	14.75
No. 1 cast, Pittsburgh....	19.00	19.00	19.50	15.75
No. 1 cast, Philadelphia..	20.60	20.00	20.00	17.00
No. 1 cast, Ch'go (net ton)	15.00	15.00	15.50	12.75
No. 1 RR. wrot, Phila....	25.00	25.00	27.00	21.50
No. 1 RR. wrot, Ch'go (net)	24.00	23.50	23.50	14.75

Coke, Connellsville, Per Net Ton at Oven:	Feb. 14, 1917.	Feb. 7, 1917.	Jan. 17, 1917.	Feb. 16, 1916.
Furnace coke, prompt....	\$10.00	\$9.00	\$8.50	\$3.75
Furnace coke, future....	7.00	6.00	6.00	2.50
Foundry coke, prompt....	11.00	10.00	10.00	3.50
Foundry coke, future....	8.00	8.00	7.00	3.25

Metals, Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York...	34.50	33.00	29.00	27.37½
Electrolytic copper, N. Y.	34.50	33.00	29.00	27.25
Spelter, St. Louis.....	10.50	10.00	9.75	20.00
Spelter, New York.....	10.75	10.25	10.00	20.25
Lead, St. Louis.....	8.00	8.30	7.50	6.15
Lead, New York.....	9.00	8.50	7.65	6.25
Tin, New York.....	53.00	55.00	44.25	42.25
Antimony (Asiatic), N. Y.	30.00	25.00	14.25	43.50
Tin plate, 100-lb. box, P'gh	7.50	7.00	7.00	4.00

worst ever known in the history of the steel business, and early relief seems out of the question. The banking of so many blast furnaces will intensify the shortage in pig iron, semi-finished and finished steel. Nearly all producers of material, from coke up, have their entire organizations at work trying to get cars and get them moved, instead of giving their energies to getting new business. They state that it is useless to go after orders, knowing that so many thousands of tons of materials are piled up now awaiting shipment. Prices seem to be on the verge of a general advance. This week black and galvanized iron and steel pipe has been generally advanced \$4 per ton, and the withdrawal of the American Sheet & Tin Plate Company from the sheet market to July 1 has firmed up prices on all grades of sheets, the independent mills at once asking higher figures. Early advances on other lines of finished steel are likely. Pig iron, billets and sheet bars are in line for an advance, due to shortage in supply. As high as \$10 has been paid for furnace coke for prompt shipment, but even with this unheard of figure producers cannot deliver it promptly. The severe cold weather of the past two weeks has done much to bring this condition about. Little attention is being paid to the export inquiry, which is heavy, as mills cannot move material they have already made for domestic customers. In a few cases there are regular sailings for South America and one or two other countries, and some export material is being shipped, but the amount is relatively small. The whole market to-day has more the appearance of reaching higher values than at any time for several months. Sales managers of some of the large steel companies state they find more disposition on the part of the trade to place orders covering their needs for the last half of the year than has existed for several months. This probably comes from knowledge by consumers that the output of steel products will be much curtailed over the next two or three months, and that present prices will likely hold into the second half and possibly over the entire year.

Pig Iron.—There is a moderately active demand for Bessemer, basic and foundry iron, but mostly from consumers who are not getting deliveries on contract purchases. They are trying to pick up small lots to

tide them over until delayed shipments are received. There is a spread of fully \$5 per ton in prices now being quoted on foundry iron. It is said that small lots for prompt shipment have sold as high as \$37 and \$38, while for second and third quarter delivery sales have been made at \$33 and \$34, at furnace. The minimum of the market to-day on No. 2 foundry is \$33, with some sellers quoting higher. Sales of Bessemer iron are mostly in lots of 100 to 200 tons for which as high as \$36 has been paid. The situation in basic iron is not so strong as it was two or three weeks ago. Considerable basic iron is being offered for resale by dealers who can shade \$30 and still have a profit. One such sale was made of 3000 tons at \$29.50, at Valley furnace, and another lot of 10,000 tons has been offered in this market for several days under \$30, at furnace. Two open-hearth steel plants have bought 7000 to 8000 tons of basic iron at slightly under \$30, at furnace, for second-quarter delivery. It is believed, however, that with the large falling off in output of Bessemer and basic iron, due to the banking of so many furnaces for lack of coke, there will be a serious shortage in the supply, and prices may advance. The Carnegie Steel Company has quite a number of blast furnaces idle and banked; the Shenango Furnace Company has two of its three furnaces at Sharpsville, Pa., banked, and will have to shut down the third unless a supply of coke is soon received. There has been quite an active demand for low-phosphorus iron; one sale of 500 tons guaranteed at 0.035 per cent or lower in phosphorus, and under 0.05 per cent in copper, was sold at \$50, at furnace. It is said that \$55 at furnace could be obtained to-day for this grade of iron. One leading producer is quoting \$33 on gray forge and \$34 on No. 2 foundry for second-half delivery, and has made several small sales. We do not reduce this week our price of \$30 on basic iron, but as stated above, this figure has been shaded. We quote standard Bessemer iron, \$35; basic, \$30; gray forge, \$31 to \$32; malleable Bessemer, \$31 to \$32, and No. 2 foundry, \$33 to \$36, prices on the latter depending on the quantity and the delivery wanted.

Billets and Sheet Bars.—It is claimed that it is harder now to get soft Bessemer and open-hearth bi-

lets and sheet bars than at any time since the shortage in supply started. One leading maker states he could readily get \$70 per ton for soft Bessemer or open-hearth billets for prompt shipment if they had any to spare. One sale has been made of 3000 tons of soft Bessemer billets, 4 x 4 in., at \$65 at mill for March-May shipment. Dealers who have steel sold are pounding the mills for deliveries, while the mills say they cannot get cars. It is said that forging billets up to 0.25 carbon have been sold at close to \$90, Pittsburgh, in small lots. We quote soft Bessemer and open-hearth billets and sheet bars at \$65 to \$70 per ton, maker's mill, Pittsburgh or Youngstown; forging billets, \$85 to \$90 for sizes up to but not including 10 x 10 in., and for carbons up to 0.25.

Ferroalloys.—The price of \$164, seaboard, for 80 per cent English ferromanganese, which has been quoted for a long time, has been withdrawn, but as yet no new price has been named. The difficulty in getting manganese ore has increased very much since the break with Germany, and this has resulted in a sensational advance in the price of domestic ferromanganese, 80 per cent now being quoted at \$250 per ton at furnace and likely to be \$300 within a short time. One sale was made last week of 100 tons at \$250, at furnace, and new inquiry is fairly active. The great scarcity in supply of ferrosilicon still exists, and 50 per cent has sold at \$200 and \$250 per ton for prompt shipment. There has been no change in official prices of 50 per cent ferrosilicon, but it is said very little of this material is being delivered on account of the shutting off of power on the Canadian side at Niagara Falls. Speiseleisen is very strong and likely to be higher. A sale was made last week of 20 per cent at \$60 at furnace. We quote 18 to 22 per cent speiseleisen at \$60 to \$65 and 25 to 30 per cent at \$70 to \$80, delivered; 9 per cent ferrosilicon, \$39 to \$41; 10 per cent, \$40 to \$42; 11 per cent, \$41 to \$43; 12 per cent, \$42 to \$44; 13 per cent, \$43.50 to \$45.50; 14 per cent, \$45.50 to \$47.50; 15 per cent, \$47.50 to \$49.50, and 16 per cent, \$50 to \$52; 7 per cent silvery, \$29.50 to \$30; 8 per cent, \$30 to \$31; 9 per cent, \$30.50; 10 per cent, \$31; 11 per cent, \$32, and 12 per cent, \$33. These prices are f.o.b. at furnace, Jackson or New Straitsville, Ohio, and Ashland, Ky., all of which have a freight rate of \$2 per gross ton to the Pittsburgh district.

Structural Material.—There is a fair amount of new inquiry, but no large jobs have been placed in this district for some time. The American Bridge Company has taken 4500 tons for a structural shop at an Eastern navy yard and about 500 tons of bridge work for the Pennsylvania Railroad. The McClintic-Marshall Company has taken 900 tons of girder work for a Western railroad. Prices are strong, and deliveries of material are much delayed on account of the car shortage. Bids are to be opened this week on 6000 to 7000 tons of structural steel for the proposed new tire plant to be built at Cumberland, Md. The Carnegie Steel Company's price on beams and channels up to 15 in. remains at 3.25c. at mill, with no promise of delivery, while the other local maker is quoting 3.25c. to 3.50c. for delivery in the second half of this year.

Plates.—The pressure on the mills for deliveries is still enormously heavy, but, instead of catching up, they are getting further behind. There is also a huge demand for export, and attractive orders are being refused almost daily by the local mills that are unable to make the deliveries. Not much is doing in new car orders, but the car companies are filled over all of this year at least. The Pressed Steel Car Company has taken 500 steel cars for the Interstate Railroad and 200 box cars for the Richmond, Fredericksburg & Potomac. We quote ¼-in. and heavier sheared plates at 3.75c. at mill, with no promise of delivery, while mills that can ship late in second quarter and in third quarter are quoting from 4c. to 4.50c. at mill for desirable orders. Small lots for fairly prompt shipment are quoted at 5c. and higher at mill.

Steel Rails.—Only small orders are being placed for standard sections, but the Carnegie Company is sold up on rails over all of this year and the first half of 1918. Nothing more has been heard of the Pennsylvania

Railroad inquiry for 205,000 tons of standard sections, which it withdrew from the market some time ago, presumably on account of prices. The new demand for light rails is lighter now than for some time. We quote light rails as follows: 25 to 45 lb., \$50; 16 to 20 lb., \$51; 12 and 14 lb., \$52; 8 and 10 lb., \$53, in carload lots, f.o.b. mill, with usual extras for less than carloads. Standard section rails of Bessemer stock are held at \$38, and open-hearth \$40 per gross ton, Pittsburgh.

Sheets.—It develops that the orders for sheets of different grades placed recently by the Ford Motor Company amounted to 175,000 to 180,000 tons, deliveries running from July 1, 1917, to July 1, 1918. Its entire requirements of sheets were placed with a leading interest, with the exception of possibly 20,000 tons that went to an outside mill, these sheets being also of special grades. The American Sheet & Tin Plate Company announces that it has withdrawn from the market on all grades of sheets for shipment up to July 1, its product being sold up. It has also declined export business. One interest has close to 35,000 tons of sheets and tin plate piled up in its various warehouses awaiting cars for shipment, and it is needless to say this material is badly needed by customers. Relief will not likely come for some time. The withdrawal of the American Company from the market has firmed up prices with other mills that at once started to quote higher prices. A very small quantity of sheets remains to be sold for delivery prior to July 1, and higher prices seem likely. Specifications against contracts are active. We now quote blue annealed sheets, Nos. 3 to 8, at 4.25c. to 4.50c., some mills quoting as high as 5c.; box annealed, one pass, Bessemer cold-rolled sheets, No. 28, 4.75c. to 5c.; No. 28 galvanized, 6.25c. to 7c.; No. 28 tin-mill black plate, 4.25c. to 4.50c., all f.o.b. mill, Pittsburgh. These prices are for carloads or larger lots.

Tin Plate.—New demand is fairly active, and for shipments of primes or wasters from stock, mills are quoting from \$7.50 to \$8 per base box. The export demand is reported heavy, and desirable export orders are being turned down almost every day by the mills that cannot spare any tin plate for export; in fact, they are unable to fully supply their domestic trade. Most large consumers are practically covered on their entire needs over this year, the price for second-half delivery to be fixed later. Some of the leading mills are also about sold out for this year, and, owing to the fuel situation, which is cutting down output considerably, the outlook now is that the price for second-half shipments will be higher than expected. On current orders prices range from \$7.50 to \$8 per base box at bill. We quote I. C.terne plate, 107 lb., at \$7.15 to \$7.65, and 200 lb., carrying 8-lb. coating, at \$14 to \$15, the usual advances applying for heavier weights and coatings.

Shafting.—Most large consumers are covered on their needs over the first half of this year, and the current demand is fairly heavy, mostly for small lots for early shipment. There has been a large increase in capacity for making shafting, and for this reason some makers are able to ship out in from 60 to 90 days from date of order. The purchases of shafting by the Ford Motor Company for the year beginning July 1 are said to have been at least one-third larger than last year. We quote cold-rolled shafting at 20 to 15 per cent off in carload lots and 10 per cent off in less than carload lots for first quarter and first half, f.o.b. Pittsburgh, freight added to point of delivery.

Railroad Spikes and Track Bolts.—New inquiry for spikes is only fairly active, but soon after the price of standard spikes was advanced to \$3.40 per 100 lb., railroads that had placed contracts at lower figures started to specify freely, with the result that local spike makers now have four to five months' work ahead. New demand for track bolts is reported fairly active for second-half delivery, one or two makers refusing to quote for delivery beyond July 1. It is said prices on track bolts will be higher in the near future. We quote track bolts with square nuts at 4.85c. to 5c. to railroads and 5c. to 5.25c. in small lots to jobbers, base. Railroad spikes, 9/16 in. and larger, \$3.40, base; 7/16 and ½ in.,

\$3.50, base; 5/16 and 3/8 in., \$3.75, base. Boat spikes, \$3.65, base, all per 100 lb., f.o.b. Pittsburgh.

Wire Products.—Current demand for wire and wire nails is reported heavy and specifications are active. Several larger makers says their entire output over the next three or four months is sold up, and they are turning down attractive export orders on which they are not able to quote. The shortage in fuels has recently cut down the output of wire and wire nails materially, one maker stating that it is not getting out at present more than 25 per cent of capacity. This may result before long in an advanced price. It is a fact too that higher prices can be had for rods than for wire nails, and this may have its influence in an early advance being made. Prices in effect at this writing are as follows: Wire nails, \$3, base, per keg; galvanized, 1 in. and longer, including large head barbed roofing nails, taking an advance over this price of \$2, and shorter than 1 in., \$2.50. Bright basic wire is \$3.05 per 100 lb.; annealed fence wire, Nos. 6 to 9, \$2.95; galvanized wire, \$3.65; galvanized barb wire and fence staples, \$3.85; painted barb wire, \$3.15; polished fence staples, \$3.15; cement-coated nails, \$2.90, base, these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to the point of delivery, terms 60 days net, less 2 per cent off for cash in 10 days. Discounts on woven wire fencing are 53 per cent off list for carload lots, 52 per cent for 1000-rod lots, and 51 per cent for small lots, f.o.b. Pittsburgh.

Wire Rods.—New demand is still heavy, with the supply becoming more limited. Several makers of rods say there would be no trouble in getting as high as \$80 for ordinary soft rods if they could spare them. A sale of about 400 tons of high-carbon rods is reported at \$85, at mill. The demand for rods from Canada is heavy, and several sales have recently been made for shipment to that country at \$75 to \$80, at mill. We quote soft Bessemer, open-hearth and chain rods, at \$75 to \$80, at maker's mill, Pittsburgh, but it would be difficult to place an order at the lower price. The advance in ferromanganese has also stiffened up prices on high-carbon rods, and we now quote these at \$85 to \$110 at mill, depending on carbons.

Iron and Steel Bars.—Both iron and steel bars are in fairly active demand, but most consumers are covered, at least through the first quarter, and some over the first half of this year. Specifications from the implement and other trades are only fairly heavy. New demand for reinforcing steel bars is not so active as some time ago, the cold weather having shut off building operations to a large extent. The nominal price of the Carnegie Steel Company on steel bars remains at 3c., but other mills are quoting as high as 3.10c. to 3.25c. at mill for second and third quarter delivery. We continue to quote refined iron bars 3.25c. and railroad test bars at 3.40c. in carload lots, f.o.b. Pittsburgh.

Rivets.—Makers report that both domestic and export demand is heavy but most of the foreign inquiries are being turned down, as domestic trade can absorb the output. Owing to slow deliveries of steel by the mills, rivet output is cut very much and shipments are held up on account of shortage of cars. Prices are strong, and there would be no trouble in getting higher than domestic prices on export orders if the makers could spare the material. On less than carload lots 10c. to 15c. per 100 lb. is readily paid over the usual carload price. Makers quote buttonhead structural rivets, 1/2 in. in diameter and larger, \$4.25 per 100 lb., base, and conehead boiler rivets, same sizes, \$4.35 per 100 lb., base, f.o.b. Pittsburgh. Terms are 30 days net, or one-half of 1 per cent for cash in 10 days.

Nuts and Bolts.—Domestic demand is heavy and fabricating shops are specifying freely against contracts. There is an active export demand, but makers cannot meet it, largely on account of slow deliveries of steel and shortage of cars. Hundreds of kegs of nuts and bolts are piled up in warehouses awaiting cars and consumers are suffering for deliveries. Prices are very strong and may be advanced in the near future. Dis-

counts are as follows, delivered in lots of 300 lb. or more, when the actual freight rate does not exceed 20c. per 100 lb., terms 30 days net, or 1 per cent for cash in 10 days:

Carriage bolts, small, rolled thread, 40 and 10 per cent; small, cut thread, 40 and 2 1/2 per cent; large, 30 and 5 per cent.

Machine bolts, h. p. nuts, small, rolled thread, 50 per cent; small, cut thread, 40 and 10 per cent; large, 35 and 5 per cent.

Machine bolts, c. p. c. and t. nuts, small, 40 per cent; large, 30 per cent. Bolt ends, h. p. nuts, 35 and 5 per cent; with c. p. nuts, 30 per cent. Lag screws (cone or gimlet point), 50 per cent.

Nuts h. p. sq. and hex., blank, \$2.50 off list, and tapped, \$2.30 off; nuts c. p. c. and t. sq., blank, \$2.10 off, and tapped, \$1.90 off; hex., blank, \$2.25 off, and tapped, \$2 off. Semi-finished hex. nuts, 50, 10 and 5 per cent. Finished and case-hardened nuts, 50, 10 and 5 per cent.

Rivets 7/16 in. in diameter and smaller, 40 and 10 per cent.

Hoops and Bands.—New demand is fairly heavy, but the large trade covered over the first quarter and part of it over the first half of this year. Specifications are active and any mill that can make fairly prompt shipments is able to get relative high prices. While the Carnegie Steel Company is still quoting steel bands at 3c. at mill, extras as per the steel bar card, and steel hoops at 3.50c. at mill, with no promise of delivery, some mills that can ship out fairly promptly are getting from 3.10c. to 3.50c. on steel bands and from 3.75c. to 4c. on steel hoops, prices depending almost entirely on the quantity and deliveries involved. We therefore quote steel bands at 3c. to 3.50c., and steel hoops from 3.50c. to 4c. at mill.

Cold-Rolled Strip Steel.—Some large consumers have covered their needs for the second quarter, and some makers have practically their entire output sold up for first half of this year. On current orders coming in for fairly prompt shipments makers are quoting \$7 to \$8 per 100 lb., depending on quantity and deliveries. We quote cold-rolled strip steel for first quarter on contracts at \$6.50, and second quarter at \$7 per 100 lb. On current orders for reasonably prompt shipment makers quote \$7 for fair-sized quantities up to \$7.50 per 100 lb. for small lots. Terms are 30 days net, less 2 per cent off for cash in 10 days, delivered in quantities of 300 lb. or more when specified for at one time.

Wrought Pipe.—All makers of black and galvanized iron and steel pipe have lowered discounts 2 points, effective from Feb. 13 and Feb. 14, the higher prices of the National Tube Company having gone into effect on the latter date. The Wheeling Steel & Iron Company took this action on butt-weld pipe about two weeks ago. On large sizes of line pipe, mills are booked up to October, and on lap-weld pipe practically for the entire year. Several large inquiries are in the market for line pipe for oil and gas projects, mostly Oklahoma and Texas, but none of the mills is in a position to quote on these except for delivery over all of this year. On butt-weld sizes of iron and steel pipe, deliveries in 30 days to 6 weeks can be secured. The new discounts on black and galvanized iron and steel pipe, effective from Feb. 14, are given on another page.

Boiler Tubes.—Makers of iron and steel tubes have practically their entire output sold up over remainder of this year and new demand is heavy. Any mill that is in position to make fairly prompt deliveries can readily secure premiums in prices. Discounts on iron and steel tubes, which are largely nominal, are given on another page.

Coke.—The car situation is worse, due largely to the very cold weather which has prevailed here for two weeks or more. On one day the car supply may be 50 to 60 per cent of that needed and on the next day it is almost nothing. Thousands of cars of coke are lying between the coke regions and Pittsburgh and also the Valleys, awaiting motive power to move them. It is said that there is more trouble from lack of motive power than from shortage of cars. Stocks at the furnaces are at a minimum, and unless conditions soon improve a number of stacks will have to bank within the next few days. Prices on prompt furnace coke are higher, some special grades selling as high as \$10 per net ton at oven, while ordinary brands are quoted at

\$9 to \$9.50 at oven. Nothing is doing in contracts, consumers not being inclined to contract at the high prices ruling. Best grades of 72-hr. foundry coke are selling at \$11 to \$12 per net ton at oven, while on contracts anywhere from \$8 to \$9, or higher, is being quoted. The output of coke in the upper and lower Connellsville regions for the week ended Feb. 3, was 305,028 tons, a decrease over the previous week of 43,474 tons. The decrease was due mainly to the closing down of ovens at a number of plants, the coke producers not being able to move coke already in storage.

Old Material.—The local scrap market is still very dull, showing few signs of early betterment, either in prices or demand. All leading consumers in this district have large stocks at their mills and they refuse to buy at any price until the stocks have been materially decreased. About the only kinds of scrap moving are low-phosphorus melting stock and borings and turnings. Prices show no material change and dealers are not pressing the market to make sales, believing values will be higher as soon as some of the scrap now on hand at the mills has been used up. We note a sale of about 600 tons of billet and bloom crop ends at \$32 per gross ton, delivered to consumers' mill in the Pittsburgh district. Prices for delivery in Pittsburgh and other consuming points that take Pittsburgh freight rates, per gross ton, are nominally as follows:

Heavy steel melting scrap, Steuben ville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh, delivered	\$22.00 to \$22.50
No. 1 foundry cast	19.00 to 19.50
Re-rolling rails, Newark and Cam- bridge, Ohio, Cumberland, Md., and Franklin, Pa.	27.00 to 28.00
Hydraulic compressed sheet scrap ..	18.00 to 18.50
Bundled sheet scrap, sides and ends, f.o.b. consumers' mills, Pittsburgh district	15.50 to 16.00
Bundled sheet stamping scrap	15.00 to 15.50
No. 1 railroad malleable stock	19.00 to 19.50
Railroad grate bars	12.50 to 13.00
Low phosphorus melting stock	32.00 to 32.75
Iron car axles	41.00 to 42.00
Steel car axles	45.00 to 46.00
Locomotive axles, steel	47.00 to 48.00
No. 1 busheling scrap	17.00 to 18.00
Machine-shop turnings	12.00 to 12.25
Old carwheels	20.50 to 21.00
Cast-iron borings	12.25 to 12.50
*Sheet bar crop ends	25.00 to 26.00
No. 1 railroad wrought scrap	23.00 to 24.00
Heavy steel axle turnings	15.50 to 16.00
Heavy breakable cast scrap	17.50 to 18.00

*Shipping point

Chicago

CHICAGO, ILL., Feb. 13, 1917.

The full tide of difficulties arising from the inability of the railroads to move materials at a rate in keeping with production and consumption is now bearing down on the Chicago district. The most critical phase of the situation is the fuel shortage, particularly coke. Already six furnaces of the leading steel company are out of operation—two blown out and four banked—and others are threatened with discontinuance. Illinois coal is being mixed with Eastern coals for the making of coke in percentages ranging from 10 to 70, and the unusually high sulphur product resulting is causing no small disturbance in steel works and foundries. The shipment of manufactured and rolled products is likewise greatly hampered. The severely cold weather is the immediate cause of the marked reduction in effective hauling power of the railroads. Materials in transit or known to be available for prompt shipment are probably more at a premium than at any time and the general question of deliveries is more speculative. Both Northern and Southern pig iron show some stiffening in prices, and a renewed interest on the part of melters, in last half iron, is evidenced by a considerable inquiry. The noteworthy new business in rolled steel is largely confined to railroad purchases. Sheet prices are firm and the general price level is slightly higher. Local jobbers, whose prices for plates have been conspicuously low as compared even with mill prices for small quantities and later deliveries, have advanced plates \$2 per ton from warehouse, which changes but little an incongruous situation. The general tone of the scrap market is somewhat firmer.

Pig Iron.—Interest in this market has been aroused by prophecies of advances to fabulous prices. This interest is reflected in a larger inquiry, particularly for the last half, and a more general canvassing of the situation. Northern producers of both coke and charcoal iron have already stiffened their prices, \$32 at furnace now being the minimum for Northern foundry, basic and malleable iron. Charcoal-iron prices range from \$33.75 to \$36.75, Chicago, and some has been sold as high as \$40 at furnace. At present the cutting down of pig-iron production is more apparent than the falling off in consumption, although the same difficulties are hampering both. In this connection, it is important to note that there are now under construction at Chicago 11 new furnaces, the majority of which will be in operation before the close of this year. There are also some evidences of a disposition to ask higher prices for Southern iron, though \$23 at Birmingham is still the market for last half. A quotation of \$23, applying to 2000 tons of 2 per cent silicon iron, with sulphur 0.055, for first half delivery, has been made. For second quarter Alabama iron, running 2.75 per cent and over in silicon, \$25.50 is being asked. For ferromanganese, some domestic producers are asking as high as \$300 for the second quarter, but it can be had on the basis of \$250 for that delivery, while for the last half a quotation of \$170 has been made on the imported alloy. For Lake Superior charcoal iron we quote delivery prices at Chicago to include a freight rate of \$1.75. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic irons, which are f.o.b. furnace, and do not include a switching charge averaging 50c. per ton:

Lake Superior charcoal, Nos. 2 to 5 ..	\$33.75 to \$35.75
Lake Superior charcoal, No. 1	34.25 to 36.25
Lake Superior charcoal, No. 6 and Scotch	34.75 to 36.75
Northern coke foundry, No. 1	32.50
Northern coke foundry, No. 2	32.00
Northern coke foundry, No. 3	31.50
Northern high phosphorus foundry ..	27.50 to 28.50
Southern coke No. 1 f'dry and 1 soft ..	27.50 to 28.50
Southern coke No. 2 f'dry and 2 soft ..	27.00 to 27.50
Malleable Bessemer	32.00
Basic	32.00
Low phosphorus	55.00
Silvery, 8 per cent	38.50 to 39.00
Bessemer ferrosilicon, 10 per cent ..	46.50 to 47.00

Rails and Track Supplies.—An important railroad of the Northwest and a Chicago to New York trunk line ordered additional rails last week in the amount of about 5000 tons each. Other small lots brought the aggregate up to about 26,000 tons. The Alaskan Engineering Commission is expected to place shortly an additional 10,000 tons for the Government railroad. An active interest in tie-plates is also noted, the New York Central having bought about 6000 tons, the Burlington being in the market for a like quantity, while another road is in the market for 14,000 tons. The modifying of railroad specifications to permit of rolling tie-plates from so-called discard steel, in the interest of better deliveries, has been considered, but as yet no sales are reported. New inquiry for spikes and bolts is noted. Quotations are as follows: Standard railroad spikes, 3.50c. to 3.60c., base; track bolts with square nuts, 4.50c. to 4.60c., base, all in carloads, Chicago; tie-plates, \$55 to \$60, f.o.b. mill, net ton; standard section Bessemer rails, Chicago, \$38, base; open-hearth, \$40; light rails, 25 to 45 lb., \$44; 16 to 20 lb., \$45; 12 lb., \$46; 8 lb., \$47; angle bars, 2.25c.

Plates.—There is no apparent diminishing of the demand. While two large interests are accepting contracts from their customers for the first half on the basis of 3.75c., Pittsburgh, the price for deliveries up to 90 days, regardless of quantity, is very generally 5c. Pittsburgh. We quote for Chicago delivery of plates from mill, at its convenience, 3.939c.; for prompt shipment, in widths up to 72 in., 4.689c. to 5.189c., and for wide plates, 4.939c. to 6.25c., depending upon deliveries.

The check, which the relatively low prices of plates out of Chicago stock have placed upon the growth of mill orders providing prompt delivery at premium prices, seems to have outlived its function in view of the higher open mill price for any first half delivery. Yet this week's advance of \$2 per ton still leaves the store price \$5 per ton below the price from mill.

The price at which plates are being sold is of little consequence to many jobbers in view of their small stocks. We quote for Chicago delivery of plates out of jobbers' stocks 4.75c.

Structural Material.—Interest in first-half contracts covering structural material is reported by some of the mills as becoming more general, but only two among the largest interests are known to be accepting reservations for that period. Among the contracts placed with bridge shops last week was one of 900 tons for Western Pacific bridge spans, taken by the McClintic-Marshall Company; another of 900 tons for the American National Bank Building, San Francisco, taken by the Central Iron Works of that city, and 325 tons for the Herring Motor Company, Des Moines, Iowa, taken by the Des Moines Bridge & Iron Company. We quote for Chicago delivery of structural steel from mill, 3.439c. to 3.689c.

We quote for Chicago delivery of structural steel out of jobbers' stocks 4c.

Sheets.—The market for box and blue annealed sheets appears to be somewhat firmer, and the general average of quotations a little bit higher. The galvanized-sheet market has also been stiffened by the upward reaction in spelter. The movement in sheets is still restricted by the limited tonnage which mills have for sale. We quote, for Chicago delivery, No. 10 blue annealed, 4.50c. to 4.75c.; box annealed, No. 16 and lighter, 5c. to 5.25c.; No. 28 galvanized, 6.50c. to 6.75c. These quotations are minimum prices for contracts. Early shipment quotations are \$5 to \$10 per ton higher.

We quote for Chicago delivery out of stock, regardless of quantity, as follows: No. 10 blue annealed, 5.25c.; No. 28 black, 5.40c.; No. 28 galvanized, 7.25c.

Bars.—Users of mild steel bars are inquiring as to the protection of their needs in the first half, and some of the mills are booking reservations for that delivery on the basis of 3c., Pittsburgh. For near-by delivery, steel bars are bringing as high as 3.50c. Activity in bar iron consists of occasional sales in small quantity at the generally prevailing price of 3c., f.o.b. mill. We quote mill shipment, Chicago, as follows: Bar iron, 3c. to 3.25c.; soft steel bars, 3.189c. to 3.439c.; hard steel bars, 3c. to 3.25c.; shafting, in carloads, 20 per cent off; less than carloads, 15 per cent off.

We now quote store prices for Chicago delivery as follows: Soft steel bars, 3.75c.; bar iron, 3.75c.; reinforcing bars, 3.75c., base, with 5c. extra for twisting in sizes $\frac{1}{2}$ in. and over and usual card extras for smaller sizes; shafting list plus 5 per cent.

Rivets and Bolts.—The bolt market is decidedly quiet, existing contracts providing for the regular needs of the trade. We quote as follows: Carriage bolts up to $\frac{3}{4}$ x 6 in., rolled thread, 40-10; cut thread, 40-2 $\frac{1}{2}$; larger sizes, 30-5; machine bolts up to $\frac{3}{4}$ x 4 in., rolled thread, with hot pressed square nuts, 50; cut thread, 40-10; large size, 35-5; gimlet-point coach screws, 50; hot pressed nuts, square, \$2.50 off per 100 lb.; hexagon, \$2.60 off. Structural rivets, $\frac{3}{4}$ to 1 $\frac{1}{4}$ in., 4.15c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

Store prices are as follows: Structural rivets, 4.50c.; boiler rivets, 4.60c.; machine bolts up to $\frac{3}{4}$ x 4 in., 40-10; larger sizes, 35-5; carriage bolts up to $\frac{3}{4}$ x 6 in., 40-2 $\frac{1}{2}$; larger sizes, 30-5; hot pressed nuts, square, \$3, and hexagon, \$2 off per 100 lb.; lag screws, 50.

Wire Products.—The trade in wire is entirely routine, with practically no improvement in respect of bringing shipments up to orders. We quote to jobbers as follows, per 100 lb.: Plain wire, Nos. 6 to 9, base, \$3.239; wire nails, \$3.189; painted barb wire, \$3.339; galvanized barb wire, \$4.039; polished staples, \$3.339; galvanized staples, \$4.039, all Chicago.

Cast-Iron Pipe.—The pipe market is not featured by any lettings of noteworthy importance, but a number of smaller jobs are being figured both with the general contracting trade and with municipal buyers. We quote as follows, per net ton, Chicago: Water pipe, 4-in., \$44.50; 6-in. and larger, \$41.50, with \$1 extra for class A water pipe and gas pipe.

Old Material.—The long stretch of exceptionally severe weather has made the picking up of scrap by the railroads and by the country dealers exceedingly difficult. Largely on the strength of the more limited offering of scrap from these sources, dealers by their

attitude are contributing to a somewhat firmer tone in the market, with the result that slightly higher prices have been secured from sales of rolling-mill and foundry scrap. For No. 1 wrought as high as \$25.75 has been paid for immediate delivery, and several transactions are noted at above \$24. No. 2 wrought has brought as high as \$24, and No. 1 busheling \$17. Steel scrap was not traded in to any extent the past week, but quotations are up from 25c. to 50c. A purchase of stove plate on the basis of \$12 is noted. Scrap offered by the railroads is confined to 3000 tons from the Santa Fe and about 900 tons from the Wabash. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton	
Old iron rails.....	\$27.00 to \$28.00
Relaying rails.....	30.00 to 31.00
Old carwheels.....	18.00 to 18.50
Old steel rails, rerolling.....	27.00 to 28.00
Old steel rails, less than 3 ft.....	24.50 to 25.00
Heavy melting steel scrap.....	21.75 to 22.25
Frogs, switches and guards, cut apart.....	21.75 to 22.25
Shoveling steel.....	18.75 to 19.25
Steel axle turnings.....	13.50 to 14.00

Per Net Ton	
Iron angles and splice bars.....	\$27.00 to \$27.50
Iron arch bars and transoms.....	27.75 to 28.25
Steel angle bars.....	20.50 to 21.00
Iron car axles.....	34.00 to 35.00
Steel car axles.....	34.00 to 35.00
No. 1 railroad wrought.....	24.00 to 25.00
No. 2 railroad wrought.....	23.00 to 24.00
Cut forge.....	23.00 to 24.00
Pipes and flues.....	13.50 to 14.00
No. 1 busheling.....	16.50 to 17.00
No. 2 busheling.....	12.50 to 13.00
Steel knuckles and couplers.....	22.50 to 23.00
Steel springs.....	23.50 to 24.00
No. 1 boilers, cut to sheets and rings.....	13.50 to 14.00
Boiler punchings.....	18.50 to 19.00
Locomotive tires, smooth.....	31.00 to 31.50
Machine-shop turnings.....	9.25 to 9.75
Cast borings.....	9.00 to 9.50
No. 1 cast scrap.....	15.00 to 15.50
Stove plate and light cast scrap.....	12.00 to 12.50
Grate bars.....	12.50 to 13.00
Brake shoes.....	12.50 to 13.00
Railroad malleable.....	17.25 to 17.75
Agricultural malleable.....	14.75 to 15.25

Philadelphia

PHILADELPHIA, PA., Feb. 14, 1917.

The possibility of this nation becoming embroiled with Germany to the extent of a declaration of war has apparently acted as a spur to the buying for steel, consumers seeking to protect themselves in case the Government should decide to draw heavily on the capacities of the mills. While one large plate mill reports a slight cessation of new business which afforded some welcome relief, other producers assert that the new demand for plates is as strong as ever, and all agree that specifications were never heavier. Mill and furnace operations have been considerably hampered by the extremely cold weather, coupled with other detriments to large output. The carbuilders, as well as the shipyards, continue to seek large tonnages of both plates and shapes. Agricultural implement makers and other consumers are seeking to cover future requirements, but the mills do not show much disposition to go beyond the second quarter. In pig iron a good business has been done, especially in prompt deliveries, and it appears that the predicted spot market is near at hand. Quotations for all grades of iron are strong, and in the case of Virginia brands they are higher. The coke market is again stronger, \$10.50 having been paid for spot furnace. Several items in the old material list are easier.

Pig Iron.—An excellent business in spot foundry iron, coupled with fair activity for second-half delivery, has been done in the past week. The spot demand springs largely from the difficulties which the railroad freight situation is placing in the way of deliveries against contracts—a particularly serious matter where special irons are used. Another cause is the fact that producers of iron are not anxious to sell too far ahead. They do not know what their costs will be in months to come. Still fresh in their minds is the fact that they booked orders heavily at much lower prices than prevail to-day, not foreseeing, of course, that they would have to pay \$9.50 to \$10.50 for spot coke. The quantities taken by foundry melters have been small mostly, although two or three lots of 1000 tons were bought. Prices generally are stronger, and in the case of some brands of Virginia

iron, they are higher. The largest Virginia producer is practically out of the market, and one has advanced his quotations, now asking \$29.50, furnace (\$32.25, Philadelphia) for No. 2 X, and \$29, furnace (\$31.75, Philadelphia) for No. 2 plain, these prices being solely for the second half. The same quotations are named by another maker of Virginia iron for second and third quarter deliveries. Another maker asks \$31.75, Philadelphia, for prompt delivery of Virginia No. 2 X. For eastern Pennsylvania No. 2 X, none of the producers is willing to consider less than \$31, furnace, and some ask up to \$33, but in one instance, at least, \$30, furnace, has been done. Based on \$31, furnace, one brand can be had around \$31.80, Philadelphia. For another brand, \$33, at furnace, was paid for a small lot delivered in western Pennsylvania, the delivered price being near \$34, but the maker does not expect to book many orders at this level. A Pennsylvania brand quoted at \$32, furnace, can be had around \$32.75, Philadelphia. For No. 1 Southern, \$26, furnace, has been paid, and for No. 2, \$24. Steel-making iron continues active. It is reported that a Pennsylvania steel company has sold 20,000 tons for export to Italian buyers at \$32.50, seaboard, April delivery. From 1000 to 1500 tons of basic was placed at \$30, furnace. Low phosphorus continues in heavy demand, and is scarcer than ever. A fairly large block for last half delivery was placed at very close to \$58, delivered. Several thousand tons are sought for shipment to Portugal. A moderate-sized lot of Bessemer was placed in Canada at \$36, furnace. Quotations for standard brands delivered in buyers' yards, prompt shipment, range about as follows:

Eastern Pa. No. 2 X foundry.....	\$31.50 to \$32.50
Eastern Pa. No. 2 plain.....	31.00 to 32.00
Virginia No. 2 X foundry.....	31.25 to 32.25
Virginia No. 2 plain.....	30.75 to 31.75
Gray forge	29.75 to 30.75
Basic	30.50
Standard low phosphorus.....	56.00 to 58.00

Iron Ore.—In the week ended Feb. 10, 7600 tons of ore from Cuba arrived at this port. Manganese ore is scarce. Only part cargoes are arriving from India, and few of these. There is plenty of ore at Rio de Janeiro, but the movement of coffee commands most of the freight space.

Ferroalloys.—Several foreign makers of 80 per cent. ferromanganese have withdrawn their quotations, and it is probable that an early advance will be announced by cable. The domestic product is difficult to obtain for delivery this side of May. For May and June, \$250, furnace, is quoted; for third quarter, \$225, and for last quarter, \$200, but not all the makers are willing to accept the prices named for the forward positions. For 5 and 10-ton lots, \$350 has been paid. Prompt spiegel-eisen is around \$65. Fifty per cent ferrosilicon is nominally \$175, Pittsburgh. It is almost impossible to get. Bessemer ferrosilicon, 11 per cent, is quiet around \$46.44, delivered. The arrival last week of 926 tons of English ferromanganese at this port is reported.

Plates.—The minimum for tank plates is 4.909c., Philadelphia, but the larger makers quote higher. One large producer reports that the new demand has been lighter than in the previous week, but another asserts that the demand shows no abatement. The shipyards are more eager than ever for deliveries, evidently fearing that the Government may requisition the output of both the mills and the shipyards. For 6000 tons of ship plates and shapes, placed yesterday, 6c., Pittsburgh, was the price for the plates, and 4c. for the shapes, these being general quotations. An inquiry for 12,000 metric tons, emanating from the French Government, is before the trade, as well as half a dozen other export inquiries calling for 1000 to 1500 tons. Production was shortened last week by the intensely cold weather, the shortage of steel-making materials, embargoes, etc. The shipyards are asked to estimate on many boats, but cannot promise early deliveries. Two vessels were placed with the Union Iron Works and two with the Fore River Shipbuilding Company. The railroad demands continue to call for steel. The larger makers quote tank plates at 5.159c., Philadelphia, ship plates (Lloyd's test) at 6.159c., Philadelphia, and marine boiler steel at 12.40c. to 14.40c., Pittsburgh.

Structural Material.—The shipyards and carbuilders are monopolizing the bulk of production, and the

mills are kept crowded, despite the extent to which reinforced concrete is being favored in bridge and building work. As a result of the latter, the bridge shops are not nearly so busy as they would like to be. The League Island Navy Yard improvements will require about 17,000 tons, all told, which probably will be supplied by the American Bridge Company. The same company is expected to supply the material for the Philadelphia subway. Quotations are unchanged at 3.659c. to 3.909c., Philadelphia.

Billets.—With one mill having none to offer, being, in fact, short for its own purposes, with other makers in more or less the same position, quotations are nominal at \$60 to \$65 for open-hearth rerolling billets, and \$75 to \$85 for forging steel.

Bars.—Agricultural implement interests are placing contracts for the second quarter, and some consumers would like to buy for the last half, but the mills are reluctant to go that far ahead. Specifications are being placed freely. The minimum for steel bars is 3.409c., Philadelphia (3.25c., Pittsburgh), with miscellaneous lots quoted up to 3.659c., Philadelphia. Iron bars are unchanged at 3.159c., Philadelphia, carload lots.

Sheets.—No. 10 blue annealed sheets are firm at 4.659c., Philadelphia.

Coke.—The market is stronger again, spot furnace having brought \$10.50, and spot foundry, \$12, per net ton at oven. Contracts for deliveries of foundry coke covering three months are quoted at \$10.50 to \$11. The nominal quotation for contract furnace is \$6 to \$8.50, but consumers who have sought to place contracts have been unable to do so. Freight rates from the principal producing districts are as follows: Connellsville, \$2.05; Latrobe, \$1.85, and Mountain, \$1.65.

Old Material.—Activity has been confined to small-lot buying. No. 1 forge fire, bundled sheets, machine shop turnings and cast borings are off 50c. Quotations for delivery in buyers' yards in this district, covering eastern Pennsylvania and taking freight rates from 35c. to \$1.35 per gross ton, are as follows:

No. 1 heavy melting steel.....	\$20.00 to \$20.50
Old steel rails, rerolling.....	30.00 to 31.00
Low phos. heavy melting steel scrap.....	30.00 to 32.00
Old iron and steel axles (for export).....	43.00 to 45.00
Old iron rails	28.00 to 29.00
Old carwheels	20.50 to 21.00
No. 1 railroad wrought	25.00 to 26.00
Wrought-iron pipe	17.00 to 18.00
No. 1 forge fire.....	14.50 to 15.00
Bundled sheets	14.50 to 15.00
No. 2 busheling	13.00 to 14.00
Machine-shop turnings	12.00 to 12.50
Cast borings	13.00 to 13.50
No. 1 cast	20.00 to 21.00
Grate bars, railroad	15.50 to 16.00
Stove plate	16.00 to 16.50
Railroad malleable	17.50 to 18.00

Cleveland

CLEVELAND, OHIO, Feb. 13, 1917.

Iron Ore.—Shipments of ore from Lake Erie docks to interior furnaces in January were 686,277 gross tons, as compared with 887,426 tons the corresponding month last year. The falling off is probably due, to some extent, to the car shortage, although furnace yards had such large stocks of ore on hand at the close of navigation they have not been crowding the docks for shipments. The curtailment in pig-iron production may also be somewhat of a factor in the decreased ore shipments. The dock balance Feb. 1 was 9,118,926 gross tons, as compared with 7,071,275 tons on the same date a year ago. With this increase of over 2,000,000 tons it is practically certain that the dock balance April 1 will exceed that on the same date last year. We quote prices as follows, delivered lower Lake ports: Old range Bessemer, \$5.95; Mesaba Bessemer, \$5.70; old range non-Bessemer, \$5.20; Mesaba non-Bessemer, \$5.05.

Pig Iron.—The demand for foundry and malleable iron has improved, both for prompt shipment and last half. Fears of a shortage and higher prices have apparently brought out some of the new inquiry. Higher prices are now being asked. The severe weather conditions are seriously interfering with blast-furnace operations, and some furnaces have considerable iron on their yards which they are unable to ship because of the car

situation. On this account, many foundries are badly in need of iron. Lake Erie furnaces are asking \$32 to \$35 for No. 2 foundry iron for the last half, and some want a premium of about \$2 for prompt shipment. A northern Ohio foundry has paid \$36 for 300 tons of No. 2 Valley iron, and prompt shipment sales are reported at \$38. A Cleveland foundry has taken 500 tons of Ironton iron at \$30, at furnace, or \$31.62 delivered, which is lower than it could be purchased from Cleveland furnaces. Some sales of Ironton iron have also been made in Detroit at lower delivered prices than those quoted by the local furnaces. It is claimed that but little basic iron is left for delivery in the first half. We note the sale of some small lots of basic, aggregating about 5000 tons, at \$31 for prompt shipment. Southern iron is more active than for some time, the increased demand being due partly to the scarcity of Northern grades and partly to the lower prices for Southern. We note the sale of four lots of Southern, aggregating 3500 tons, for shipment to Canada, at \$23.50, subject to acceptance by the seller, and 1000 tons to a Cleveland foundry at the same price. One Southern interest has advanced its price to \$24, Birmingham, for No. 2 for the last half, but some iron can probably still be had at \$23.50. We quote, delivered Cleveland, as follows:

Bessemer	\$35.95
Basic	\$30.95 to 31.95
Northern No. 2 foundry	32.30 to 33.30
Southern No. 2 foundry	27.50 to 29.00
Gray forge	29.95
Ohio silvery, 8 per cent silicon	39.62 to 41.62
Standard low phos., Valley furnace	52.00

Coke.—Several leading producers have decided to quote \$6.50 per net ton at oven for standard Connells-ville foundry coke for contracts for the last half or for the year starting with July. These quotations will be made only for actual sales of definite tonnages, so that consumers will be unable to cancel the orders should prices drop later. Other producers are still refusing to name contract prices. So far no contracts have been closed at the announced price. There is a steady demand for small lots of prompt shipment foundry coke from consumers who are suffering from delayed deliveries on contracts. Sales are reported at \$11.50, and some producers are asking \$12. We note the sale of 20 carloads of Virginia coke at \$10, at oven, for February-June delivery.

Bolts, Nuts and Rivets.—The demand for bolts and nuts continues active, and prices are firm. There is a good demand for rivets on contracts, and considerable new business is coming out. We quote rivets at 4.25c., Pittsburgh, for structural, and 4.35c. for boiler rivets. Bolt and nut discounts are as follows:

Common carriage bolts, $\frac{3}{4}$ x 6 in., smaller or shorter, rolled thread, 40 and 10; cut thread, 40 and 2 $\frac{1}{2}$; larger or longer, 30 and 5. Machine bolts with h.p. nuts, $\frac{3}{4}$ x 4 in., smaller or shorter, rolled thread, 50; cut thread, 40 and 10; larger or longer, 35 and 5. Lag bolts, cone point, 50. Square and hexagon h.p. nuts, blank, \$2.50 off the list; tapped, \$2.30 off. C.p.c. and t. hexagon nuts, all sizes, blank, \$2.25 off; tapped, \$2.00 off. Cold pressed semi-finished hexagon nuts, 50, 10 and 5 off.

Finished Iron and Steel.—Interest is centered in getting deliveries on steel needed by manufacturers to insure the continuance of plant operations. Work in many factories is being curtailed because of conditions growing out of the railroad embargoes and car shortage, resulting in scarcity of steel and fuel, and delay in shipping finished products. There is a good volume of specifications, but current orders for early shipment have fallen off. The demand for plates continues heavy, but local mills that are quoting plates at 5c. to 5.50c., Pittsburgh, are losing considerable Western business because of lower prices quoted by Chicago jobbers. The Variety Iron & Steel Works Company, Cleveland, has taken 400 tons of steel for ore bins for the Iroquois Iron Company. An inquiry is out for steel for extensions to the Gillsy Hotel, Cleveland, requiring 600 to 800 tons. Considerable steel for export is being stored in the yards of local mills because of inability to make shipments to the seaboard. The demand for sheets continues heavy, and several Ohio mills are now entirely out of the market. We quote sheets at 4.50c. to 5.50c., Ohio mill, for No. 28 black; 4.25c.

to 5c. for No. 10 blue annealed, and 6.50c. to 7.50c. for No. 28 galvanized. Bar iron is unchanged at 3c., Cleveland. Warehouse prices are 4c. for steel bars; 4.10c. for structural material; 4.75c. for plates; 5c. for hoops, and 5c. for blue annealed sheets.

Old Material.—The market is dull, about the only activity being in carload sales between dealers. The trade feels that prices are likely to go higher, and is not accepting prices at which some mills are trying to buy. Dealers still require considerable scrap to fill old contracts, and this demand is keeping prices fairly firm at about recent levels. Sharon is reported in the market for heavy melting steel scrap at \$22.50. The severe weather, car shortage and embargoes are causing a more serious interference with shipments than at any previous time this winter. The New York Central embargo is preventing shipments to consumers on its line in Cleveland and elsewhere. An embargo has been declared against the Central Steel Company in Massillon. We quote, f.o.b. Cleveland, as follows:

Per Gross Ton	
Steel rails	\$21.00 to \$21.50
Steel rails, rerolling	27.00 to 28.00
Steel rails under 3 ft.	26.00 to 26.50
Iron rails	28.00 to 28.50
Steel car axles	47.00 to 48.00
Heavy melting steel	22.00 to 22.50
Carwheels	19.50 to 20.00
Relaying rails, 50 lb. and over	37.00 to 38.00
Agricultural malleable	15.00 to 15.50
Railroad malleable	20.50 to 21.00
Steel axle turnings	16.50 to 17.00
Light bundled sheet scrap	14.50 to 15.00

Per Net Ton	
Iron car axles	\$44.00 to \$45.00
Cast borings	9.25 to 9.50
Iron and steel turnings and drillings	9.00 to 9.25
No. 1 busheling	17.75 to 18.00
No. 1 railroad wrought	24.00 to 25.00
No. 1 cast	17.75 to 18.25
Railroad grate bars	13.00 to 13.25
Stove plate	13.00 to 13.25

Buffalo

BUFFALO, N. Y., Feb. 13, 1917.

Pig Iron.—Demand keeps up, particularly for foundry grades. Inquiry for small lots for prompt delivery is very active, due to acute shortage of stocks at foundries resulting from delayed shipments from furnaces. On account of their sold-up condition, there is little iron obtainable from Buffalo producers for delivery over the remainder of the year. At present full production is being interfered with by the unusually severe weather, combined with the unprecedented delays in the receipt of raw materials. One stack has been obliged to shut down owing to non-receipt of coke; three trainloads only a short distance from destination were blocked on account of snowdrifts, zero weather and lack of locomotive power. Some foundries in Buffalo and vicinity are seriously handicapped, and have to borrow small amounts of iron and coke from other melters, employing motor trucks for the purpose. Charcoal iron is very scarce, and the small tonnage available is being sold at \$37.50 to \$40 at warehouse, Buffalo, according to brand and analysis. For local irons for first quarter and first half delivery we quote as follows, f.o.b. furnace, Buffalo:

High silicon irons	\$35.00 to \$35.50
No. 1 foundry	35.00 to 35.50
No. 2 X foundry	35.00 to 35.50
No. 2 plain	35.00 to 35.50
No. 3 foundry	35.00 to 35.50
Gray forge	35.00 to 35.50
Malleable	35.00 to 35.50
Basic	35.00 to 35.50
Bessemer	35.00 to 35.50
Charcoal, according to brand and analysis	37.50 to 40.00

Finished Iron and Steel.—The transportation situation was the most unsatisfactory of any week yet; every line out of the Pittsburgh district was embargoed, also New York Central lines east of Buffalo, and Grand Trunk and Michigan Central lines north into Canada. Thousands of cars are held in the various railroad yards here. Users of finished products are more concerned about getting material through embargoes than they are about buying for further requirements. Specifications, however, are coming in away ahead of monthly quota requirements, as the users believe they will be in urgent need of the materi-

als by the time they get through, and they do not wish to run risks of cancellation by mills. Architects Esenwein and Johnson, Buffalo, will early next month be ready for figures on the structural steel for the Hotel Penn Harris, a 12-story hotel at Harrisburg, Pa.

Old Material.—Only a small aggregate of business is reported for the week. The limiting of transactions is largely attributable to embargoes and deranged transportation. Some small lots have been sold at nominal prices to dispose of material standing on tracks. Some heavy melting steel has been sold at concession prices on this account; a few sales are reported at \$1 to \$2 per ton below current schedule. Low phosphorus scrap is commanding a higher price than a week ago. There is a strong undercurrent, and the prevailing opinion among dealers is that prices will advance again as soon as shipping conditions become more normal. We quote dealers' asking prices, per gross ton, f.o.b Buffalo, as follows:

Heavy melting steel	\$24.00 to \$25.00
Low phosphorus	32.00 to 36.00
No. 1 railroad wrought	28.00 to 29.00
No. 1 railroad and machinery cast	22.50 to 23.50
Iron axles	45.00
Steel axles	45.00
Carwheels	23.00 to 23.50
Railroad malleable	22.00 to 23.00
Machine shop turnings	10.50 to 11.00
Heavy axle turnings	16.00 to 16.50
Clean cast borings	11.00 to 11.50
Iron rails	25.00 to 26.00
Locomotive grate bars	15.00 to 15.50
Stove plate	14.00 to 14.50
Wrought pipe	16.00 to 16.50
No. 1 busheling scrap	20.50 to 21.50
No. 2 busheling scrap	13.00 to 13.50
Bundled sheet scrap	14.00 to 14.50

Cincinnati

CINCINNATI, OHIO, Feb. 14, 1916.—(By Wire.)

Pig Iron.—Southern Ohio furnaces have advanced No. 2 foundry to \$31 per ton, Ironton, for any shipment this year, and malleable and basic to \$33. Not much iron of any of the three grades is available for movement in the first half, and these figures practically represent only last half quotations. Bessemer ferrosilicon is in excellent demand, but inquiries have not yet developed into orders. Based on a 10 per cent analysis, the price today is \$46 at furnace. The Ohio silvery irons are almost unobtainable for prompt shipment, and as a consequence authentic quotations are unobtainable. Southern foundry iron is unchanged, with a number of small sales for first-half delivery reported as being made in central Ohio, Indiana, and a few in Michigan at \$24 to \$25, Birmingham basis. Last-half business is acceptable at \$23, and it is also rumored that some iron can be contracted for lower than this for strictly last-quarter delivery. A sale of 1500 tons of special analysis iron was made to a central Ohio firm for shipment during the remainder of the year, and two of 500 tons of Southern foundry were taken by Illinois consumers for the last half. It is reliably reported that a Michigan melter contracted for 3000 tons of Northern malleable for last-half movement and 500 tons of the same kind of iron was absorbed by an Ohio manufacturer. Virginia foundry irons are becoming scarcer, and practically all producing interests have withdrawn from the market as far as this territory is concerned except on a few off-grade lots for prompt shipment. Virginia No. 2 X for last half is quoted at \$28 to \$29 at furnace. Based on freight rates of \$2.90 from Birmingham and \$1.26 from Ironton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft	\$26.40 to \$28.40
Southern coke, No. 2 f'dry and 2 soft	25.90 to 27.90
Southern coke, No. 3 foundry	25.40 to 27.40
Southern coke, No. 4 foundry	24.90 to 25.40
Southern gray forge	24.40 to 26.40
Ohio silvery, 8 per cent silicon	39.26 to 41.26
Southern Ohio coke, No. 1	32.76
Southern Ohio coke, No. 2	32.26
Southern Ohio coke, No. 3	31.76
Southern Ohio malleable Bessemer	34.26
Basic, Northern	34.26
Lake Superior charcoal	30.20 to 31.20
Standard Southern carwheel	28.90 to 29.40

(By Mail)

Coke.—The prevailing high prices have not cut off buying of either furnace or foundry coke in small

quantities, where prompt deliveries can be promised. All the way from \$12 to \$14 per ton at oven on foundry coke has been obtained in the Connellsville, Wise County and Pocahontas districts for prompt shipment. Contract quotations range from \$7 to \$10, which is an advance over the previous week, although desirable forward business would not be turned down by some producers below the minimum figure named. Furnace coke is almost on the same basis as foundry for prompt shipment, but contract figures are around \$5.50 to \$6.50 per net ton at oven.

Finished Material.—Orders reported by jobbers for reinforcing concrete bars are said to be surprisingly good, in spite of the adverse weather conditions for building operations. The demand for sheets is also holding up well. Railroad track material is slow, but the question of deliveries on purchases has some effect on this line. Screw machine products are in excellent demand. We quote No. 28 galvanized sheets, f.o.b. Cincinnati or Newport, Ky., at 7.15c., and No. 28 black sheets at 5.15c. It is understood that some sheets have been offered in other producing districts that would figure lower than these quotations, but ability to make shipments promptly is to be considered. Local store prices are as follows: Small structural shapes, 4.10c.; steel bars, 3.85c. to 3.90c.; rounds and squares, 2-in. and over, 4.45c. base; plates, 4.70c.; wire nails, \$3.40 to \$3.50 per keg base; round head rivets, 4.50c. to 4.60c., and No. 10 blue annealed sheets, 4.85c. to 4.90c.

Old Material.—Shipments moving to Pittsburgh and other points East are harder to get through. There is also a delay to other consuming points. But incoming shipments are slow, thereby balancing receipts with the outgoing movement of scrap. No changes in quotations are to be noted, and the following are dealers' prices f.o.b. at yards, southern Ohio and Cincinnati:

Per Gross Ton	
Bundled sheet scrap	\$14.00 to \$14.50
Old iron rails	24.25 to 24.75
Relaying rails, 50 lb. and up	27.75 to 28.25
Rerolling steel rails	24.25 to 24.75
Heavy melting steel scrap	20.25 to 20.75
Steel rails for melting	20.25 to 20.75

Per Net Ton	
No. 1 railroad wrought	\$21.00 to \$21.50
Cast borings	6.50 to 7.00
Steel turnings	6.50 to 7.00
Railroad cast	15.75 to 16.75
No. 1 machinery cast	17.50 to 18.00
Burnt scrap	9.75 to 10.25
Iron axles	32.50 to 33.00
Locomotive tires (smooth inside)	27.00 to 27.50
Pipes and flues	13.25 to 13.75
Malleable cast	14.75 to 15.25
Railroad tank and sheet	11.75 to 12.25

St. Louis

ST. LOUIS, MO., Feb. 12, 1917.

Pig Iron.—The market continues in a hesitant condition as to transactions, but in the matter of price the tone is decidedly firmer. The largest inquiry outstanding is for 200 tons of No. 3 Southern foundry for second quarter. A feature of the market has been the increasing inquiry for ferromanganese.

Coke.—No prompt shipment coke has been available in this market at any price the past week, and consumers would readily pay \$12.50 to \$13 per ton if it could be obtained. This applies to both foundry and furnace coke. By-product coke is altogether out of the market also because of the sold-up condition of the sources of supply.

Finished Iron and Steel.—Little new business on a contract basis is appearing, but specifications are freely presented, and are being urged for structural material and bars. Light rails are in very good demand, particularly from coal companies. In standard section rails an inquiry for 500 tons of 80-lb appeared during the week, with the necessary accessories, for a Southwestern road. Movement out of warehouse has continued active, and for such materials we quote as follows: Soft steel bars, 3.80c.; iron bars, 3.70c.; structural material, 4.05c.; tank plates, 4.80c.; No. 10 blue annealed sheets, 5.30c.; No. 28 black sheets, one pass, cold

rolled, 5.75c.; No. 28 galvanized sheets, 7.50c. Advances are reported as expected on warehoused material.

Old Material.—Scrap has continued in a nominal state as a result of the general situation, plus the embargoes of the various sections which are affecting the movement. At the same time, also, the shortage of cars is preventing the picking up of material which would otherwise be available, and this tends to decrease the supply, making all interests cautious. There has been some demand for No. 1 wrought, but that has been due mostly to shortage among the dealers who have been trying to cover. Lists out include 600 tons from the Chicago, Peoria & St. Louis, 2000 tons from the Southern, and a number of small lists from other sources, including local industries. We quote dealers' prices, f.o.b. customers' works, St. Louis industrial district, as follows:

Per Gross Ton

Old iron rails	\$26.00 to \$26.50
Old steel rails, rerolling	26.00 to 26.50
Old steel rails, less than 3 ft.	27.00 to 27.50
Relaying rails, standard section, subject to inspection	33.00 to 34.00
Old carwheels	18.50 to 19.00
No. 1 railroad heavy melting steel scrap	22.00 to 22.50
Heavy shoveling steel	19.00 to 19.50
Ordinary shoveling steel	17.50 to 18.00
Frogs, switches and guards cut apart	22.00 to 22.50
Ordinary bundled sheet scrap	13.50 to 14.00

Per Net Ton

Iron angle bars	\$26.00 to \$26.50
Steel angle bars	21.00 to 21.50
Iron car axles	34.00 to 35.00
Steel car axles	34.00 to 35.00
Wrought arch bars and transoms	27.50 to 28.00
No. 1 railroad wrought	23.00 to 23.50
No. 2 railroad wrought	21.50 to 22.00
Railroad springs	22.50 to 23.00
Steel couplers and knuckles	23.50 to 24.00
Locomotive tires, 42 in. and over, smooth inside	29.00 to 30.00
No. 1 dealers' forge	17.50 to 18.00
Cast iron borings	8.50 to 9.00
No. 1 busheling	15.50 to 16.00
No. 1 boilers, cut to sheets and rings	13.00 to 13.50
No. 1 railroad cast scrap	14.00 to 14.50
Stove plate and light cast scrap	10.00 to 10.50
Railroad malleable	15.50 to 16.00
Agricultural malleable	13.50 to 14.00
Pipes and flues	14.00 to 14.50
Heavy railroad sheet and tank scrap	13.50 to 14.00
Railroad grate bars	11.50 to 12.00
Machine shop turnings	9.00 to 9.50
Heavy axle and tire turnings	12.50 to 13.00

Birmingham

BIRMINGHAM, ALA., Feb. 12, 1917.

Cast-Iron Pipe.—The leading interest is understood to have recently received a much larger volume of orders than had been expected in the dull season and considering the high prices. There has been a considerable influx of orders for flange oil pipe. Orders of 1000 to 1500 tons have come from Western municipalities. R. D. Wood & Co., Philadelphia, hold an option on the property of the National Cast Iron Pipe Company, Birmingham, which has some time to run. The National Company is capitalized at \$300,000. We quote, per net ton, f.o.b. pipe shop yards, as follows: 4-in., \$39; 6-in. and upward, \$36, with \$1 added for gas pipe and special lengths.

Pig Iron.—The anxiety of consumers to have delivery on their entire contract promptly and frequent requests for anticipating deliveries are so marked as to indicate that foundries are melting a greater quantity of metal than they had expected. Telegrams asking shipment ahead of schedule are received daily. Added to this, the stocks on Alabama yards decreased 30,000 tons in January in spite of another record-breaking output. Furnace operators are encouraged to feel that the market is strong and may go perhaps somewhat higher when necessities force a buying movement. For the present purchases are not on a large scale. Spot carload and small lots average between \$24 and \$25 and second half sales bring \$23 and \$23.50, although, in some instances, it is believed \$23 is shaded. Some second quarter sales at \$23 have also been made. The Tennessee Company has blown in its only idle Bessemer stack, repairs on which were rushed and consumed but a few weeks. The Matthews Iron Company is rushing

work on its leased furnace at Rome, Ga., and expects to blow in about April 1. Eagle furnace near Attalla will soon be making basic for the Gulf States Steel Company. Not much export iron has as yet been diverted to domestic consumption. One maker under contract with the British Government enjoys the advantage of being at one end of a railroad line whose other is in a south Atlantic seaport, hence has 100 cars shuttling back and forth with its furnace output, thus enabling prompt shipment. Chicago stove works have recently purchased lots of 500 to 1500 tons and the bulk of the business, outside of the South, has been in the Middle West. We quote, per gross ton, f.o.b. Birmingham district furnaces, as follows:

No. 1 foundry and soft	\$23.50 to \$25.50
No. 2 foundry and soft	23.00 to 25.00
No. 2 foundry	22.50 to 24.50
No. 4 foundry	22.25 to 24.25
Gray forge	22.00 to 24.00
Basic	23.50 to 25.00
Charcoal	25.00 to 26.00

Coal and Coke.—Both coal and coke are even stronger than they have been, especially for spot. Some spot standard beehive coke has sold at \$11. Spot minimums are \$9.50 to \$10.50 and for long time contracts in quantities around \$7.50 per net ton at oven. The Gulf States Steel Company will soon start its Koppers by-product coke-oven plant, which is located at Gadsden. Consumers are clamoring for coal and premiums for delivery are obtained. The scarcity of cars accentuates the price tendency. As high as \$6 per ton for domestic coal is charged in Birmingham. Spot steam coal brings around \$3.

Old Material.—Consumers are holding off and dealers are shy at filling yards until more light is thrown on the export situation. Prices remain about the same as last week, but transactions have not been large. We quote, per gross ton, f.o.b. dealers' yards, as follows:

Old steel axles	\$35.00 to \$36.00
Old steel rails	17.00 to 18.00
No. 1 wrought	17.00 to 18.00
No. 1 melting steel	14.00 to 14.50
No. 1 machinery	16.50 to 17.00
Carwheels	13.00 to 13.50
Tram carwheels	12.00 to 12.50
Stove plate and light	11.00 to 11.50

San Francisco

SAN FRANCISCO, CAL., Feb. 6, 1917.

Pacific coast business is apparently limited by the ability of the manufacturers to supply materials, the difficulty in regard to most products being to get deliveries. Jobbing stocks are fairly large in some quarters, but the high prices are having some deterrent effect on construction work. In shipbuilding, however, no important work is being delayed by reason of high costs. In all lines, practically, the number of inquiries is encouraging, so the outlook for the year is most promising despite every handicap.

Bars.—There is quite a little demand for reinforcing bars, which indicates tentative activity in the near future on important building projects. The export demand is holding up better than the local. Prices are firm on the mill basis, but show no further advances. In the local market small bars are quoted at 4.35c. and large bars from the East at 4.85c.

Structural Material.—The market is strong. There is a constant demand for forgings of all classes. The Southern Pacific Railroad has been compelled to resort to a new type of car construction by inability to obtain sufficient quantities of the required steel. The company is building at its San Francisco shops 300 cars, and at the Sacramento shops 500 cars, all flats, of combined wood and steel instead of all steel. Numerous industrial structures are to be built this spring in California, and there is no little worrying about deliveries. Coast representatives of the Eastern mills are making special efforts to supply their customers. Little hope is offered of getting structural steel under two or three months.

Plates.—Some concerns are out of the market on this material at present, as well as on bolts and rivets. Prices are very firm for all kinds of plate material. Shipbuilding has been handicapped time after time on

account of slow deliveries, notwithstanding every effort being made to use such stock as can be obtained locally. Tank plates are selling at 5.50c.

Sheets.—The call for blue annealed is persistent, but the supply is slow in most cases. There is a better movement in corrugated galvanized and painted corrugated. Shipments are delayed, of course, and traffic conditions are hard. The market is stiff.

Wrought Pipe.—There was a rather lively placing of standard tubing just prior to recent advanced freight rates on Dec. 30, but the movement is more limited this month. Jobbing concerns appear to be pretty well stocked. All country business, especially in the oil fields, is good, the demand being for the extra heavy oil casings required by the greater depth of the California oil wells. Prices in proportion to the mill basis are being rigidly maintained.

Cast-Iron Pipe.—The demand by municipalities is encouraging. Contracts for 10,000 ft. of 8-in. pipe are to be let this week at Woodland, Cal., the pipe to be used for the city water works. The quotation per net ton on 6-in. is \$49; 4-in., \$52, with \$1 extra on class A and gas pipe.

Pig Iron.—Pig iron is weak. Few inquiries are out. Most of the important consumers bought heavily last year, and some are said to have enough to last throughout 1917. In this city No. 1 foundry iron is priced at \$36 per gross ton.

Coke.—The local demand is light, with \$20 per net ton being obtained for spot stock.

Old Material.—Dealers report an active demand but limited supply. Prices are firm, averaging about \$15 or \$16 per gross ton on steel. Cast iron scrap is firm at around \$22 per net ton. An unsubstantiated report is current that scrap for the Orient is selling at higher prices, but in view of the vessel situation this seems unlikely.

Rails.—The United States Steel Products Company has been awarded the contract for 610 gross tons of 9-in. girder rails for an extension of the municipal railroad to the Twin Peaks tunnel and is also to supply 520 tons of 70-lb. standard rails for the tunnel tracks, which latter are to be in 60-ft. lengths to save extra cost of joints and bonds. This length is practicable by reason of the even normal temperature in the tunnel, which is 12,000 ft. long.

New York

NEW YORK, Feb. 14, 1917.

Pig Iron.—Business in foundry iron in the eastern territory has been a little more active in the last few days, sales aggregating about 5000 tons made by Eastern furnaces for shipment into the New England territory. One manufacturer of machine tools who buys in the New York market has closed for about 1500 tons out of a total of 2500 tons inquired for, shipment to be made over the last half of the year. It is understood that most of this iron will come from an eastern New York furnace and a small tonnage from Virginia furnaces. Other sales made in lots of 500 to 1000 tons and aggregating 4500 tons, were made by eastern and central Pennsylvania furnaces at \$30 at furnace for No. 2 X, shipment to be made over the last half of the year. Some small lots for early shipment have sold as high as \$32 at Lehigh Valley furnaces. Several other contracts are pending aggregating about 4000 tons. Steel-making iron is scarce and higher. One large eastern Pennsylvania steel company is sounding the market for a heavy tonnage of basic iron, but the greatest demand for steel-making grades is on foreign account. It is estimated that recent sales for export aggregate 200,000 tons, including basic and Bessemer. A New Jersey interest is credited with having disposed of 160,000 tons to local agents of the allied governments, shipment to be made over the second and third quarters, but much will depend upon the ability of the sellers to obtain Bessemer ore. Another lot of 20,000 tons of basic iron

was sold by an eastern Pennsylvania interest at close to \$32 seaboard for export to Italy. Sales of Bessemer iron are reported to have been made at between \$36 and \$37 delivered at Atlantic seaboard. A Portuguese inquiry is for 5000 tons of low-phosphorus iron. One lot of 1000 tons of high-silicon Bessemer was sold at \$40 seaboard for export to Switzerland, and the same purchasers are again in the market. Some interior consumers are reported to have resold 5000 tons of basic at \$31, Valley furnace. The impression is that this iron was for export. One Virginia furnace has advanced prices of No. 2 foundry to \$30 but sales have been made 25c. to 50c. per ton less in the last few days. Two other Virginia producing interests have withdrawn from the market. One large eastern consumer has come into the market for malleable Bessemer for March and April shipment and there are several other smaller inquiries for malleable for various shipments. We quote at tidewater for early delivery: No. 1 foundry, \$32 to \$33; No. 2 X, \$31.50 to \$32.50; No. 2 plain, \$30.50 to \$31; Southern iron at tidewater, \$31 for No. 1 and \$29 to \$30 for No. 2 foundry and No. 2 soft.

Ferroalloys.—Nearly all of the British makers of ferromanganese have instructed their representatives here to make no more sales until further notice. Before doing so, however, 6000 tons were sold to domestic consumers for delivery in the last half at \$164, seaboard. One representative has a limited amount which he can sell for delivery in the last half at \$180, seaboard. It is believed that any further sales for delivery this year will be made at an advance of from \$10 to \$50 per ton, seaboard. The entire manganese market is much stronger than a week ago; some lots have been sold at \$250, delivered, for early delivery and some at \$200 for a little later delivery and probably 3000 tons have been disposed of at anywhere from \$185 to \$250, delivered. One quotation is reported at \$300 for spot material. Higher prices are not improbable partly because of the position of the British alloy but also because of a constantly advancing price for Brazilian manganese ore. It is stated that large sales of this ore could be consummated if it were possible to obtain the vessels with which to transport it. Because of the high freight rates now being paid on Brazilian coffee, it is reported that space for manganese ore is difficult to obtain and that to do so decidedly higher freight rates will have to be paid ultimately, advancing the price of the ore possibly 30c to 40c per unit. Receipts of the British alloy in January, so far furnished THE IRON AGE, indicate importations of between 5000 and 6000 tons. The spiegeleisen market is also considerably stronger. Sales of several thousand tons are reported for forward delivery, and it is probable that \$70 to \$75 per ton, furnace, could be obtained for spot material. The contract price ranges between \$60 and \$70, furnace, depending upon the delivery and the quantity. Ferrosilicon, 50 per cent, continues in urgent demand with prices for spot or early delivery ranging anywhere from \$150 to \$200 per ton delivered, with the contract price unchanged at \$99 to \$100.

Structural Material.—Interest in structural steel work is largely confined to the placing of Government contracts which in the last week have called for 15,000 tons of shapes. The McClintic-Marshall Construction Company has submitted the lowest bid to the Navy Department for the construction of crane runways at the Norfolk Navy Yard and will doubtless be awarded the contract; 300 calendar days will be allowed for the execution of the work; about 7000 tons of steel will be used. Bids have also been submitted on 7000 tons of structural steel for shipment to the Panama Canal. The Virginia Bridge & Iron Company, it is understood, will furnish 500 tons of structural shapes for the dirigible hangar at Pensacola, Fla.; 180 days will be allowed for completion of the work. Fabricators anticipate specifications from the Government for several thousand tons of structural steel to cover improvements to the Government plant on Puget Sound. The Navy Department has the privilege of increasing its order for crane runways at League Island recently placed with the American Bridge Company, by which the capacity of the plant will be doubled, but only about 1500 tons.

more of steel will be required. The option has not yet been exercised. No awards have yet been made of the Philadelphia subway contracts; bids are now being scrutinized at Harrisburg. Several large orders for manufacturing plant extensions, present and prospective, are of unusual interest to fabricating shops. James Stewart & Co., Inc., having the general contract for extensions to the Studebaker automobile plant at South Bend, Ind., has placed the contract for 6000 tons of structural steel with the Wisconsin Bridge Company. Only 2500 tons of the total will be fabricated at this time. The total improvements will call for 10,000 tons of shapes. Improvements to the plant of the Kelly Springfield Tire Company, Cumberland, W. Va., calling for 7000 tons of structural steel, it is now reported, are held in abeyance. In the New York metropolitan district relatively few building contracts are being closed, but the Hay Foundry & Iron Works will fabricate 2000 tons of steel for the Tiffany Studio building, Forty-eighth Street and Madison Avenue. The Western Pacific Railroad has placed a contract for one plate-girder span and three truss spans, requiring 1000 tons, with the McClintic-Marshall Company; the Toledo Railway & Light Company, 250 tons for transmission towers, to the American Bridge Company. Some 918 tons for the American National Bank Building, San Francisco, has been awarded to the Central Iron Company. The American Bridge Company and the Ohio & West Virginia Bridge Company have a joint contract for 300 tons for improvements to the Steubenville bridge. The Alan Wood Iron & Steel Company is making improvements to its furnaces, requiring 300 tons. The Chesapeake & Ohio Railroad is in the market for 400 tons of bridge work. We quote mill shipments of shapes in two to five months at 3.419c. to 3.919c., New York, and late this year and in early 1918, 3.419c., New York. Warehouse shipments are now at 4.10c., New York.

Plates and Bars.—Carbuilders and locomotive shops are understood to have placed contracts for upward of 50,000 tons of bars, plates and shapes with a Pittsburgh mill for shipment over the last quarter of 1917 and the first quarter of 1918 and other contracts for 100,000 tons are pending. An Atlantic coast shipyard has placed a contract for 30,000 tons of steel plates for three large boats with a Pittsburgh mill for shipment over the third quarter of 1918. Few if any of the large export contracts pending have been closed, but several new inquiries have come out in the last day or two, including moderate tonnages for Japan and Italy. The Spanish contract noted last week has not yet been closed. The United States Government is reported on the eve of closing a contract for 100 submarines, requiring several thousand tons of plates. The Pressed Steel Car Company has closed with a Pittsburgh mill for a moderate tonnage of bars and plates for the construction of cars for a Southern road. A domestic manufacturer of war munitions is asking for prices on 2000 tons of steel billets for March and April shipment. There are foreign inquiries for shell steel still unsatisfied. Tank plates are less active. One eastern Pennsylvania mill could make shipments in four to six weeks and is quoting 4½c. to 5c. per lb. f.o.b. mill, according to tonnage, specifications and time of delivery. There is one inquiry in the market for 7500 tons of plates to export to Mexico, for oil tanks. Eastern Pennsylvania mills are being embarrassed by the difficulties to secure fuel, fire brick, scrap and other material; production, as a result, has been cut down sharply since the first of February. We quote mill shipments of steel bars at 3.169c. to 3.669c., New York, the lower price for indefinite delivery and the higher for small quantities in, say, three months. We quote mill shipments of bar iron at 3.169c., New York. Out of warehouse iron bars are 3.70c., and steel bars are now 4c., New York.

Railroad Equipment.—Several southern railroads are closing contracts for 45,000 tons of standard section rails for shipment during the third and fourth quarters of 1918. The New York State Railways, Syracuse, has bought about 1000 tons of high tee rails from eastern and western Pennsylvania mills. The Russian government is urgently in the market for 1500 tons of girder rails for early shipment and has developed plans which

will call for a very heavy tonnage of tee rails; contracts for the latter are likely to be held in abeyance for many months. Eastern railroads are buying frogs, switches and crossovers for terminals a little more actively. Most of the business is coming to eastern Pennsylvania mills. The French Government and state railroads of France are now negotiating for 37,000 cars, the original inquiry for 20,000 cars having been increased to 42,000, of which 5000 have already been bought. American car builders are endeavoring to secure options on the steel required.

Cast-Iron Pipe.—This is the period when municipal lettings are usually few and light. The outlook is promising, however, and as the winter passes it is expected that business will become active. Export inquiries are considerably more numerous. The price of carload lots of 6-in., class B and heavier, is maintained at \$41.50 per net ton, tidewater, with class A and gas pipe taking an extra of \$1 per ton.

Old Material.—The general market is exceedingly dull. The only features worthy of note are quite heavy transactions in relaying rails and the continuance of the export demand for heavy melting steel scrap, old axles and a few other specialties. Brokers quote buying prices as follows to local dealers and producers, per gross ton, New York:

Heavy melting steel scrap (for eastern Pennsylvania shipment).....	\$17.50 to \$18.00
Old steel rails (short lengths) or equivalent	18.50 to 19.00
Relaying rails	37.00 to 38.00
Re-rolling rails	27.00 to 27.50
Iron and steel car axles (for export).....	40.00
No. 1 railroad wrought.....	22.00 to 23.00
Wrought-iron track scrap.....	21.00 to 21.50
No. 1 yard wrought, long.....	19.00 to 19.50
Light iron (nominal).....	4.50 to 5.00
Cast borings (clean).....	10.50 to 11.00
Machine shop turnings.....	10.00 to 10.50
Mixed borings and turnings (nominal)	9.00 to 9.50
Wrought iron pipe (not galvanized or enameled)	15.00 to 15.25

Cast scrap is moving in moderate volume. The prices given below are such as are paid by consumers purchasing in good quantities, but foundries in New York City and Brooklyn are able to secure small lots from nearby dealers at \$1.50 to \$2 less per gross ton:

No. 1 cast.....	\$20.50 to \$21.00
No. 2 cast.....	18.50 to 19.00
Stove plate	13.75 to 14.00
Locomotive grate bars.....	13.75 to 14.00
Old carwheels	20.00 to 20.50
Malleable cast (railroad).....	18.00 to 18.50

BRITISH STEEL MARKET

Export Licenses for Pig Iron Freer—Ferromanganese Makers Not Quoting

LONDON, ENGLAND, Feb. 14, 1917.—(By Cable.)

The pig-iron market is moderately active, with the tone generally firm and export licenses more abundant. American billets are nominal, with c.i.f. offers lacking. Wire rods are quoted at £28 10s. upward, c.i.f. Tin plates are weaker, with permits scarce, and quoted at 26s 6d. Ferromanganese is nominal and sellers are not quoting. We quote as follows:

Tin plates, coke, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 26s 6d. against 27s 6d. a week ago.
Steel black sheets, No. 28, export, f.o.b. Liverpool, £19 5s.
Hematite pig iron, f.o.b. Tees, 142s 6d.
Sheet bars (Welsh) delivered at works in Swansea Valley, £15 5s. nominal.
Ferromanganese, nominal, against £34 to £36 and upward a week ago.
Ferrosilicon 50 per cent, c.i.f., £29 10s.

Bids were received Jan. 22 by the commanding officer, Rock Island, Ill., schedule 964, for 6030 ft. of chrome vanadium spring steel annealed, as follows: The Halcomb Steel Company, Syracuse, N. Y., 24c. per lb., delivery in 14 days, accepted; the L. Helmuth Company, New York City, 26c. per lb., with delivery 65 days, 20c. per lb., with delivery 2 to 4 weeks, in bars 14 ft., 25c. per lb., with delivery 6 to 8 weeks in bars 14 ft.; the Vulcan Crucible Steel Company, Aliquippa, Pa., 14.5c. per lb., in bars 13 ft., delivery 2 to 3 weeks.

Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30.7c.; Birmingham, Ala., 45c. Denver, pipe, 76.1c., minimum carload, 46,000 lb.; structural steel and steel bars, 83.6c., minimum carload, 36,000 lb. Pacific coast (by rail only), pipe, 65c.; structural steel and steel bars, 75c., minimum carload, 50,000 lb.; structural steel and steel bars, 80c., minimum carload, 40,000 lb. No freight rates are being published via the Panama Canal, as the boats are being used in transatlantic trade.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, 1/4 in. thick and over, and zees 3 in. and over, 3.25c. to 3.50c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	.10
H-beams over 18 in.	.10
Angles over 6 in., on one or both legs.	.10
Angles, 3 in. on one or both legs less than 1/4 in. thick, as per steel bar card, Sept. 1, 1909.	.70
Tees, structural sizes (except elevator, handrail, car truck and conductor rail).	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909.	.20 to .80
Deck beams and bulb angles.	.30
Handrail tees.	.75
Cutting to lengths, under 3 ft. to 2 ft. inclusive.	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive.	.50
Cutting to lengths, under 1 ft.	1.55
No charge for cutting to lengths 3 ft. and over.	

Plates.—Tank plates, 1/4 in. thick, 6 in. up to 100 in. wide, 3.75c. to 5c., base, net cash, 30 days, or 1/2 of 1 per cent discount in 10 days, carload lots. Extras are:

	Cents per lb.
Tank steel	Base
Pressing steel (not flange steel for boilers)	.10
Boiler and flange steel plates	.15
"A. B. M. A." and ordinary firebox steel plates	.20
Still bottom steel	.30
Locomotive firebox steel	.50
Marine steel, special extras and prices on application.	

Gage Extras

Rectangular, 1/4 in. thick, over 6 in. wide to 100 in. wide. Base	
Lighter than 1/4 in., to 3/16 in., up to 72 in. wide.	.10
Lighter than 1/4 in., including 3/16 in., over 72 in. to 84 in.	.20
Lighter than 1/4 in., including 3/16 in., over 84 in. to 96 in.	.30
Lighter than 1/4 in., including 3/16 in., over 96 in. to 100 in.	.40
Lighter than 1/4 in., including 3/16 in., over 100 in. to 102 in.	.50
Lighter than 3/16 in., including No. 8, up to 72 in. wide.	.15
Lighter than 3/16 in., including No. 8, over 72 in. to 84 in.	.25
Lighter than 3/16 in., including No. 8, over 84 in. to 96 in.	.35
Lighter than No. 8, including No. 10, up to 60 in. wide.	.30
Lighter than No. 8, including No. 10, over 60 in. to 64 in.	.35
Up to 72 in. and not less than 10.2 lb. per sq. ft. will be considered 1/4 in.	
Over 72 in. must be ordered 1/4 in. thick on edge, or not less than 11 lb. per sq. ft. to take base price.	
Over 72 in. wide, ordered less than 11 lb. per sq. ft., down to weight of 3/16 in., take price of 3/16 in.	
Over 72 in., ordered weight 3/16 in., take No. 8 price.	
Over 72 in., ordered weight No. 8, take No. 10 price.	

Width Extras

Over 100 in. to 110 in. inclusive.	.05
Over 110 in. to 115 in. inclusive.	.10
Over 115 in. to 120 in. inclusive.	.15
Over 120 in. to 125 in. inclusive.	.25
Over 125 in. to 130 in. inclusive.	.50
Over 130 in.	1.00

Length Extras

Universal plates 80 ft. long up to 90 ft. long.	.05
Universal plates 90 ft. long up to 100 ft. long.	.10
Universal plates 100 ft. long up to 110 ft. long.	.20

Cutting Extras

No charge for rectangular plates to lengths 3 ft. and over.	
Lengths under 3 ft. to 2 ft. inclusive.	.25
Lengths under 2 ft. to 1 ft. inclusive.	.50
Lengths under 1 ft.	1.55
Circles 3 ft. in diameter to 100 in.	.30
Circles over 100 to 110 in. (width extra)	.35
Circles over 110 to 115 in. (width extra)	.40
Circles over 115 to 120 in. (width extra)	.45
Circles over 120 to 125 in. (width extra)	.55
Circles over 125 to 130 in. (width extra)	.80
Circles over 130 in. (width extra)	1.30
Circles under 3 ft., to 2 ft., inclusive.	.55
Circles under 2 ft., to 1 ft., inclusive.	.80
Circles under 1 ft.	1.85
Half circles take circle extras.	
Sketches not over four straight cuts, inc. straight taper	.10
Sketches having more than four straight cuts.	.20
Plates sheared to a radius take complete circle extras.	

*Including extra for width.

Wire Rods.—Including chain rods, \$75 to \$80.

Wire Products.—Prices to jobbers effective Nov. 27: Fence wire Nos. 6 to 9, per 100 lb., terms 60 days or 2 per cent discount in 10 days, carload lots, annealed, \$2.95; galvanized, \$3.65. Galvanized barb wire and

staples, \$3.85; painted, \$3.15. Wire nails, \$3. Galvanized nails, 1 in. and longer, \$2 advance over base price; shorter than 1 in., \$2.50 advance over base price. Cement-coated nails, \$2.90. Woven wire fencing, 53 per cent off list for carloads, 52 off for 1000-rod lots, 51 off for less than 1000-rod lots.

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card in effect from Feb. 14, 1917, all full weight:

Steel				Iron			
Inches	Black	Galv.		Inches	Black	Galv.	
1/8, 1/4 and 3/8	55	28 1/2		1/8 and 1/4	44	17	
1/2	59	44 1/2		3/8	45	18	
3/4 to 3	62	48 1/2		1/2	49	21	
				3/4 to 1 1/2	52	28	
Butt Weld				Lap Weld			
2	55	42 1/2		1 1/4	38	23	
2 1/2 to 6	58	45 1/2		1 1/2	44	26	
7 to 12	55	41 1/2		2	45	31	
13 and 14	45 1/2	..		2 1/2 to 4	47	34	
15	43	..		4 1/2 to 6	47	34	
				7 to 12	46	33	
Reamed and Drifted				Butt Weld, extra strong, plain ends			
1 to 3, butt	60	46 1/2		1/8 to 1 1/2, butt	47	30	
2, lap	53	40 1/2		1 1/4, lap	33	17	
2 1/2 to 6, lap	56	43 1/2		1 1/2, lap	39	24	
				2, lap	40	25	
				2 1/2 to 4, lap	43	28	
Lap Weld, extra strong, plain ends				Butt Weld, extra strong, plain ends			
1/8, 1/4 and 3/8	51	33 1/2		1/8, 1/4 and 3/8	44	27	
1/2	56	43 1/2		1/2	49	36	
3/4 to 1 1/2	60	47 1/2		3/4 to 1 1/2	53	38	
2 to 3	61	48 1/2					
Lap Weld, extra strong, plain ends				Lap Weld, extra strong, plain ends			
2	53	41 1/2		1 1/4	40	25	
2 1/2 to 4	56	44 1/2		1 1/2	45	31	
4 1/2 to 6	55	43 1/2		2	47	34	
7 to 8	51	37 1/2		2 1/2 to 4	49	37	
9 to 12	46	32 1/2		4 1/2 to 6	48	36	
				7 to 8	42	30	
				9 to 12	37	25	

To the large jobbing trade an additional 5 per cent is allowed over the above discounts, which are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized, but in some sections of the country discounts on less than carloads are three (3) points less (higher price) than the carload discount on both black and galvanized steel pipe.

On butt and lap weld sizes of black iron pipe, discounts for less than carload lots to jobbers are four (4) points lower (higher price) than carload lots, and on butt and lap weld galvanized iron pipe are five (5) points lower (higher price).

Boiler Tubes.—Discounts on less than carloads, freight to be added, effective from Nov. 1, 1916, except 3 to 4 1/2 in. steel from Nov. 20, are as follows:

Lap Welded Steel	Standard Charcoal Iron
1 1/4 in.	23
1 1/2 and 2 in.	35
2 1/4 in.	32
2 1/2 and 2 3/4 in.	38
3 and 3 1/4 in.	43
3 1/2 to 4 1/2 in.	44
5 and 6 in.	37
7 to 13 in.	34

Locomotive and steamship special charcoal grades bring higher prices.

1 3/4 in., over 18 ft., and not exceeding 22 ft., 10 per cent net extra.

2 in. and larger, over 22 ft., 10 per cent net extra.

Sheets.—Makers' prices for mill shipments on sheets of United States standard gage, in carload and larger lots, are as follows, 30 days net, or 2 per cent discount in 10 days:

Blue Annealed Sheets	Cents per lb.
Nos. 3 to 8	4.25 to 4.50
Nos. 9 to 12	4.00 to 4.25
Nos. 13 to 16	4.10 to 4.25
No. 17 and lighter gages are based on \$4.75 per 100 lb. for No. 28 Bessemer black sheets.	

Box Annealed Sheets, Cold Rolled	Cents per lb.
Nos. 17 to 21	4.55 to 4.80
Nos. 22 and 24	4.60 to 4.85
Nos. 25 and 26	4.65 to 4.90
No. 27	4.70 to 4.95
No. 28	4.75 to 5.00
No. 29	4.80 to 5.05
No. 30	4.90 to 5.15

Galvanized Sheets of Black Sheet Gage	Cents per lb.
Nos. 10 and 11	5.25 to 5.75
Nos. 12 to 14	5.35 to 5.85
Nos. 15 and 16	5.50 to 6.00
Nos. 17 to 21	5.65 to 6.15
Nos. 22 and 24	5.80 to 6.30
Nos. 25 and 26	5.95 to 6.45
No. 27	6.00 to 6.50
No. 28	6.25 to 6.75
No. 29	6.40 to 6.90
No. 30	6.55 to 7.05

Tin Mill Black Plate	Cents per lb.
Nos. 15 and 16	4.05 to 4.20
Nos. 17 to 21	4.10 to 4.25
Nos. 22 to 24	4.15 to 4.30
Nos. 25 to 27	4.20 to 4.35
No. 28	4.25 to 4.40
No. 29	4.30 to 4.45
No. 30	4.30 to 4.45
Nos. 30 1/2 and 31	4.35 to 4.50

Metal Markets

The Week's Prices

Cents Per Pound for Early Delivery							
	Copper, New York	Tin, New York	Lead, New York	St. Louis	Spelter, New York	St. Louis	
Feb. Lake							
7.....	33.50	33.50	55.00	8.50	8.40	10.37½	10.12½
8.....	34.00	34.00	54.50	8.75	8.65	10.50	10.25
9.....	34.50	34.50	54.00	8.75	8.65	10.75	10.50
10.....	34.50	34.50	.....	8.75	8.65	10.75	10.50
11.....	34.50	34.50	53.00	9.00	8.90	10.75	10.50
12.....	34.50	34.50	53.00	9.00	8.90	10.75	10.50
13.....	34.50	34.50	53.00	9.00	8.90	10.75	10.50

NEW YORK, Feb. 14, 1917.

Copper buying is restricted to occasional lots of resale metal at almost any price the seller wishes to ask. Tin is quiet and lower. The scarcity of prompt lead continues to dominate the situation and quotations are higher. Spelter has been quiet, but prices are firm. Antimony has advanced to 30c. because of the scarcity of prompt, and uncertainty over future arrivals and demand.

New York

Copper.—Except for occasional small-lot buying of prompt the market is at a standstill. It is estimated that in the past week not more than 1500 tons changed hands. How prices vary is indicated by the fact that in the latter part of the week some spot electrolytic was available at 34.50c., although that was more nearly the quotation for March delivery. Since that time, it is reported that 36c. has been paid for spot. The situation is one where the usual sellers are not anxious to sell, and when they do they are likely to exact fancy premiums. The producers are not offering anything before July, and some of them apparently do not feel certain enough of the future to take July business. Second hands offered April electrolytic yesterday at 34c., and April, May and June at 33.50c., and May, June and July at 33c. The London market for spot electrolytic yesterday was £147 or £2 higher than a week ago. The exports this month, including yesterday, totaled 11,719 tons.

Tin.—Spot Straits was quoted yesterday at 53c. The week has been a quiet one. On Feb. 7 two brokers are reported to have done a business amounting to about 200 tons between them, in July, August and September deliveries, but the general trade found the market dull, on that day, as well as since. The sinking of ships with tin aboard appears to have been discounted, and there is not the uneasiness in the market that ordinarily would be expected. Throughout the week the wide spread between Banca and Straits—2½c. to 3c.—has attracted attention, but there are more sellers than buyers, and the former are becoming anxious for orders. Yesterday one lot of 25 tons, eastern shipment, was taken. The arrivals this month total 1525 tons, and there is afloat 3498 tons. Less advanced information concerning arrivals is available than ordinarily.

Lead.—The prompt market continues to be strictly ruled by supply and demand. Though some shipments have arrived in the past few days, they were not sufficient to bring about much change in the situation, and spot lots continue to command premiums. On Feb. 8 a lot of 500 tons of February was taken at 9c., St. Louis. March delivery is becoming hard to find also. The American Smelting & Refining Company advanced its price \$10 a ton, Feb. 9, or to 8.50c., New York, at which level it is reported to have sold to some of its larger and regular customers, although the general understanding is that the company's quotations are used to establish an average for monthly settlements. The London quotation is unchanged at £30.10s. The exports this month, including yesterday, total only 330 tons.

Spelter.—In a quiet market, with both consumers and producers inclined to await developments, quotations have continued firm. Meanwhile, production is suffering serious interference from the extremely cold weather, and a further strengthening feature is the

higher cost of ore. The New York quotation for prompt prime Western yesterday was about 10.75c., and St. Louis, 10.50c., these prices also applying to February. March is ¼c. lower. The exports this month, including yesterday, total 4524 tons. The London quotation for spot was unchanged yesterday at £47.

Antimony.—The nominal quotation for spot Chinese and Japanese antimony is 30c., duty paid. Demand is dormant. Efforts to buy probably would send prices still higher. Those who have antimony are holding it tightly. While the situation is attributed to the failure of arrivals from the West, also to interferences with cables to the Far East, there are those who assert that considerable metal is in local warehouses awaiting a new munitions demand.

Aluminum.—No. 1 virgin aluminum, 98 to 99 per cent pure, is unchanged at 57c. to 59c. per lb.

Old Metals.—The strength of the market is persistent. Dealers' selling prices are as follows:

	Cents per lb.
Copper, heavy and crucible.....	31.00 to 32.00
Copper, heavy and wire.....	29.00 to 30.00
Copper, light and bottoms.....	25.00 to 26.00
Brass, heavy.....	18.50 to 19.50
Brass, light.....	14.00 to 15.00
Heavy machine composition.....	25.50 to 26.00
No. 1 yellow rod brass turnings.....	19.00 to 19.50
No. 1 red brass or composition turnings.....	21.00 to 23.00
Lead, heavy.....	8.00
Lead, tea.....	7.50
Zinc.....	8.50

Chicago

FEB. 13.—A tightening up of the available supply of non-ferrous metals is generally encountered, with prices steadily rising. Very little copper is obtainable for prompt shipment. Lead and spelter are in a like situation and tin alone seems to be in somewhat easier position than a week ago. We quote: Casting copper, 31.50c.; Lake copper, 34.50c.; tin, carloads, 54c., and small lots, 50c. to 60c.; lead, 9c. to 9.50c.; spelter, 10.50c. to 10.75c.; sheet zinc, 21c.; Cookson's antimony, 50c.; other grades, 32.50c. to 35c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 26.50c.; copper bottoms, 24.50c.; copper clips, 25.50c.; red brass, 24c.; yellow brass, 18c.; lead pipe, 7.50c.; zinc, 7.50c.; pewter, No. 1, 30c.; tinfoil, 35c.; block tin pipe, 40c.

St. Louis

FEB. 12.—Prices to-day are reported as follows: Lead, carload lots, 8.75c. bid and 9c. asked; spelter, carload lots, nominal, 10c. to 10.75c., according to delivery. Less than carload lots: Lead, 9c.; spelter, 11.50c.; tin, 59c.; Lake copper, 36c.; electrolytic copper, 35c.; Asiatic antimony, 40c. In the Joplin district the range on zinc blende was \$10 higher than the preceding week, at \$90 per ton for the top, and nothing lower than \$80 on second grades, with the average for the district \$85. On calamine the range was \$40 to \$50, with the week's average \$45. Lead ore jumped sharply, and broke all records, reaching \$108 per ton, with an average for the week of \$104. The demand was much better, while the weather and other conditions led to some curtailment of production. On miscellaneous scrap metals we quote dealers' buying prices as follows: Light brass, 12.50c.; heavy yellow brass, 14c.; heavy red brass and light copper, 20c.; heavy copper and copper wire, 23.50c.; pewter, 25c.; tinfoil, 35c.; zinc, 7c.; lead, 6c.; tea lead, 4c.

The Jeffrey Mfg. Company, Columbus, manufacturer of elevating, conveying, screening, crushing, pulverizing, transmission and mining machinery, recently opened an office at 421 Rockefeller Building, Cleveland. It is in charge of W. E. Holloway and C. B. Reed, both of whom have been connected with the sales and engineering departments of the company for a number of years.

The Harrison Steel Castings Company, Attica, Ind., has been incorporated with \$300,000 capital stock to manufacture steel castings. The directors are Joseph W. Harrison, Glen W. Harrison and Charles R. Milford.

Pittsburgh and Nearby Districts

The Pittsburgh Galvanizing Company, whose plant is now located at Twenty-sixth Street and the Allegheny Valley Railroad, Pittsburgh, will about April 1 occupy the buildings formerly used by the Independent Bridge Company on the North Side, in that city. It will install in the plant new galvanizing equipment, consisting of three large kettles, a 5-ton overhead Whiting crane, four jib cranes and other necessary apparatus, having a capacity for galvanizing about 200 tons of material every 24 hr. The Independent Bridge Company is operating its new plant on Neville Island, Pittsburgh. The building formerly occupied by the Pittsburgh Galvanizing Company will be taken over by the Pittsburgh Valve, Foundry & Construction Company, whose plant is located adjacent to it.

The Mine Safety Appliances Company, incorporated with a capital of \$100,000, and having offices at 539-541 Fourth Avenue, Pittsburgh, does not intend building a plant as it is entirely a selling organization.

The Luntz-Stocker Iron Company is a newcomer in the iron and steel scrap trade in the Pittsburgh district, organized by C. T. Luntz and H. F. Stocker. Offices have been opened at 611 Park Building, Pittsburgh. Mr. Luntz is the son of Samuel Luntz, Canton Iron & Metal Company, and was formerly associated with the Luntz Iron & Steel Company, Canton. Mr. Stocker was with the Pittsburgh office of the Cohen-Schwartz Rail & Steel Company until Feb. 1, when he resigned to form the new firm, and has been in the scrap business for 14 years, part of the time with the Wilkoff Company, Youngstown, and later with Trimble, Mudge & Co.

The Topping Motor Truck & Machinery Company, Pittsburgh, has been incorporated with a capital of \$25,000 by Charles T. Topping, John Pfeil and Oscar Wilson.

The Tech Mfg. Company, Pittsburgh, has been organized with a capital of \$10,000 to manufacture electrical and mechanical specialties.

The monthly meeting of the mechanical section of the Engineers' Society of Western Pennsylvania was held in Pittsburgh, on the evening of Feb. 6. A discussion of "The Burning of Blast-Furnace Gas under Boilers" was participated in by a number of leading engineers.

At the annual meeting of the Wilkoff Company, dealer in iron and steel scrap, Youngstown, held last week, William Wilkoff was re-elected president; Isaac Wilkoff, secretary, and D. J. Wilkoff, treasurer. The company reported its business for 1916 in both volume and profits to have been very satisfactory.

At the annual meeting of the Youngstown Steel Car Company, Youngstown, held last week, William Wilkoff was re-elected president; D. J. Wilkoff, treasurer, and L. C. Wilkoff, secretary. The company manufactures mining and industrial steel cars, and reports an active demand for its products.

The Western Conduit Company, subsidiary of the Youngstown Sheet & Tube Company, has been dissolved and will hereafter be operated as a department of the parent company. It is likely that in the near future the Andrews & Hitchcock Iron Company, which has two blast furnaces at Hubbard, and is also owned by the Youngstown Sheet & Tube Company, will be dissolved and operated as a department.

The Union Drawn Steel Company, Beaver Falls, Pa., is adding a machine shop, 80 x 170 ft., to its plant.

The Wheeling Mold & Foundry Company, Wheeling, W. Va., has practically abandoned the making of shells, having sold the equipment to a Canadian company. While the profits on shell orders were not so large as expected, they were fairly satisfactory. The company's net profits for the past year were equal to 42.37 per cent on the stock. The profit on munitions was \$186,437; on general foundry business, \$347,381; total, \$533,819. After deductions for taxes, interest, depreciation, etc., the net was \$423,744. Shipments for the year comprised iron and steel castings, \$1,333,805; rolls, \$480,408; tunnel segments, \$400,090; shells, \$1,350,556;

total, \$3,564,861. The stockholders authorized the issue of \$500,000 preferred stock to be paid as a stock dividend to holders of the \$1,000,000 common stock of record Jan. 30.

The Youngstown Sheet & Tube Company has about completed the building of its new merchant steel-bar mill, and has rolled a few billets to test it. Owing to the heavy demand for steel for the other departments, this mill will probably be regularly operated for some time.

The new No. 11 open-hearth furnace of the Brier Hill Steel Company, Youngstown, was started last week. This is a 100-ton furnace, and the company is building another, which is expected to be ready for operation in about 60 days. It will then have 12 furnaces.

The S. Obermayer Company, Pittsburgh, is putting on the market what it has named the Rilliton brass cleaner, which acts as a deoxidizer in ladles or crucibles.

The Mahoning Valley Steel Company, Jacob D. Waddell, president, which has a sheet-mill plant at Niles, Ohio, is negotiating for 6½ acres adjacent to the plant to be used as railroad and storage yards.

The monthly meeting of the Association of Iron and Steel Electrical Engineers will be held in the Fort Pitt Hotel, Pittsburgh, on Saturday evening, Feb. 17, preceded by a dinner. Papers on the general safety movement and accident prevention will be presented by the Safety Committee, of which H. A. Schultz is chairman. The March meeting of the Pittsburgh Section will be held in the same hotel, March 17, and will be under the auspices of the Electrical Development Committee, of which Stewart Coey is chairman.

The Bessemer & Lake Erie Railroad, Carnegie Building, Pittsburgh, is in the market for an 80-in.-driving wheel lathe for its shops at Greenville, Pa.

The American Steel Company, Park Building, Pittsburgh, has bought three acres adjoining its wire-nail plant at Ellwood City, Pa., on which it is erecting a mill for making flat cold-rolled strip steel. It is also installing wire-drawing equipment for rolled flat, square, oval and special shape wires, and expects to increase its output of wire nails and other products to 3000 tons per month by July 1. Its present output is a little over 1000 tons per month. The American Cotter Pin Company, a subsidiary, is increasing its capital from \$50,000 to \$100,000 to take care of the rapidly increasing demands for its product. The cotter pins made by this company are sold under the name of Kelkotters and are said to be the only self-spreading pins made.

The annual meeting of the Trumbull Steel Company was held in Warren, Ohio, last week. Officers were re-elected as follows: Jonathan Warner, president; W. H. B. Ward, Philip Wick and D. W. Kerr, vice-presidents; W. McFate, secretary, and Lloyd Booth, treasurer. After the meeting Jonathan Warner, president, made the following statement: "We are doing an annual business of about \$15,000,000 per year. In 1916 we shipped 107,000 tons of finished material. This rate was increased 50 per cent in December, and in the months of May and June, 1917, it will be increased another 50 per cent, which will make our total output in excess of 250,000 tons. Our new steel plant is in course of construction and we will be making ingots in September. We have booked for delivery during the year 1917 about \$8,000,000 of tin plate and other finished products."

The Trussed Concrete Steel Company held its second annual convention at Youngstown, Jan. 23 to 26. Branch managers and representatives from every section of the country were in attendance, nearly 200 taking part in the meetings. The business sessions brought out many valuable papers and interesting discussions. New developments and improvements were presented as well as a review of the work of the past year and prospects for the future. The convention was opened Tuesday morning by S. M. Fechheimer, general chairman and publicity manager, and the principal address was by Julius Kahn, president, who in a masterly way reviewed the excellent work of the company for the past year and outlined a program for 1917 business.

The entertainment features were well planned and arranged, every evening being occupied. The annual banquet was given Thursday evening and was particularly enjoyable.

Wharton Steel Company Organization

The organization of the Wharton Steel Company, under the new ownership of J. Leonard Replogle and associates, was effected Feb. 8. Mr. Replogle becomes the chairman of the board of directors and H. S. Endsley, formerly general counsel for the Cambria Steel Company, is president. I. Townsend Burden and Ernest Hillman are vice-presidents. The directors are Mr. Replogle, Mr. Endsley, Mr. Burden, Harry Payne Whitney, Charles MacNeill, James J. Flannery, J. Rogers Flannery, L. W. Baldwin and L. G. Waring. F. B. Dutton, formerly identified with the Pennsylvania Steel Company at Lebanon, has been made general superintendent. The capital stock is \$3,000,000, against \$10,000,000, the capital of the former company.

The company plans to be producing iron some time in April and already has bookings, largely for export, said to be sufficient in volume to take the output for the remainder of the year.

Youngstown Iron & Steel Company Changes

For several weeks Eastern parties and others have been buying heavily of the preferred and common stocks of the Youngstown Iron & Steel Company, evidently with the object of securing a controlling interest. On Thursday, Feb. 15, John O. Pew retires as president of the company and Frederick H. Schmidt, recently of New York, becomes president. It is said that other changes among officials will be made and if the control of the company passes into new hands some large plant extensions are proposed and probably some new lines of product will be made.

Telegraphic advises received at the hour of going to press state that the Sharon Steel Hoop Company, Sharon, Pa., has bought a controlling interest in the Youngstown Iron & Steel Company, and will likely take over the concern before this week is out. It is understood the purchaser paid \$200 a share for the preferred stock bought.

Louisville Steel & Iron Company in Operation

The Louisville Steel & Iron Company's plant, Louisville, Ky., is being remodeled and will soon be ready for the prompt delivery of iron bars, mild and machinery steel bars and concrete reinforcing bars. W. A. Welborne, Welborne & Co., 44 Whitehall Street, New York, exporters, is financing the improvements. The work is being rushed. The plant should have been rolling last week but for the fact that a temperature of 3 deg. below zero prevailing for several days froze the pipes conveying water to the plant. A new boiler has been put in place, making three in all, and the furnaces have been relined. The plant will roll round and square bars from 3/16 in. to 2 in. and flat to 4 x 3/4 in. Local business has already been booked for the first quarter including sizes 1, 3/4 and 3/8 in. at prices ranging from 3c. to 3.20c., Pittsburgh, base. The officers of the company will be announced in a short time.

Americanization of foreign workmen and the naturalization of aliens engaged in industrial work throughout Pennsylvania will be undertaken by the State Department of Labor and Industry this year, announces Commissioner John Price Jackson, head of the department. Enlistment of all forces possible in the industrial field is the objective aimed at. Commissioner Jackson has also been directing the mobilization of statistics to indicate the location, product and capacity of every industrial plant in Pennsylvania for a cohesive and readily available reference work in any emergency. A compilation of 30,000 Pennsylvania industrial establishments, by alphabetical classification, by class of industry and by county distribution, has been turned over to the Naval Consulting Board of the United States as a directory where munitions and supplies may be obtained in Pennsylvania.

OBITUARY

CHARLES MILLER, president Randolph-Clowes Company, Waterbury, Conn., died at his home in that city, Feb. 6, aged 70 years. He was for many years a prominent merchant in Waterbury, retiring from that branch of trade several years ago to buy an interest in the Randolph-Clowes Company, later becoming sole proprietor of the business, which thrived greatly under his administration.

WILLIAM O. HENDERER, president Osborn Engineering Company, Cleveland, died in Florida, Feb. 8, of peritonitis, contracted while on a fishing trip, aged 50 years. He was a member of the American Society of Civil Engineers and past president of the Cleveland Engineering Society.

WALKER PERCY, general counsel for the Tennessee Coal, Iron & Railroad Company, Birmingham, Ala., accidentally killed himself last week while cleaning a gun preparatory to a hunting trip. He was 54 years of age and one of the South's most brilliant lawyers.

Iron and Industrial Stocks

NEW YORK, Feb. 14, 1917.

Continued weakness, with a marked decrease in transactions, is a condensed history of the situation in stocks since the last report. No great improvement is expected as long as our relations with Germany continue uncertain. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Allis-Chal., com., 25 3/4 - 27 1/2	Gulf States Steel, 115 - 118
Allis-Chal., pref., 81 1/2 - 84	Int. Harv. of N. J., com., 113 - 117
Am. British Mfg., com., 6 - 9	Int. Harv. of N. J., pref., 120
Am. Can., com., 42 - 45 1/4	Int. Harv. Corp., com., 78 3/4 - 81
Am. Can., pref., 107 1/2 - 108 1/4	La Belle Iron, com., 75 1/4 - 77
Am. Car & Fdy., com., 61 1/2 - 66	La Belle Iron, pref., 125
Am. Car & Fdy., pref., 117	Lacka. Steel, 74 1/4 - 80 3/4
Am. Loco., com., 69 1/4 - 74 1/2	Lake Sup. Corp., 16 - 17 1/4
Am. Rad., com., 42 1/2 - 45	Lima Loco., 56 - 58 1/2
Am. Ship, com., 60 - 62	Midvale Steel, 53 1/4 - 57 1/4
Am. Ship, pref., 95	Nat. Acm., 33 - 35
Am. Steel Fdries., 59 1/4 - 62	Nat. En. & Stm., com., 29 - 32 1/2
Bald. Loco., com., 52 1/4 - 59	Nat. En. & Stm., pref., 95 1/4
Bald. Loco., pref., 100 1/4 - 100 3/4	N. Y. Air Brake, 141 - 143
Beth. Steel, com., 390 - 415	Pitts. Steel, pref., 100 1/2 - 101 1/4
Beth. Steel, Class B., 120 - 127 1/2	Pressed Stl., com., 76 - 78 1/2
Cambria Steel, 100	Pressed Stl., pref., 105 1/4 - 106 1/2
Can. Car & Fdry., pref., 38	Ry. Steel Spring, com., 46 - 48 1/2
Central Fdry., pref., 37	Republic, com., 73 1/2 - 79
Charcoal Iron, com., 7 1/2 - 8	Republic, pref., 101 1/4 - 102
Charcoal Iron, pref., 6 1/2 - 6 3/4	Sloss, com., 58 - 65 1/2
Chic. Pneu. Tool., 65 - 67	Transue-Williams, 41 - 44
Colo. Fuel, 42 1/2 - 45 1/4	Un. Alloy Steel, 43 - 44
Cruc. Steel, com., 63 1/2 - 69 1/4	U. S. Pipe, com., 18 3/4 - 20 1/4
Cruc. Steel, pref., 111 - 113	U. S. Steel, com., 103 1/4 - 108 1/4
Deere & Co., pref., 98	U. S. Steel, pref., 117 - 118
Driggs-Seabury, 55	Va. L. C. & Coke, 48 - 48 1/2
Gen. Electric, 161 1/4 - 164 1/4	Westing. Elec., 50 1/2 - 53 1/4
Gt. No. Ore Cert., 30 3/4 - 33 1/4	Warwick, 9 1/4 - 9 1/2

Dividends

The Dominion Iron & Steel Corporation, 3 1/2 per cent on the preferred stock, payable April 1.
The General Electric Company, regular quarterly, 2 per cent, payable April 15.
The Mitchell Motors Company, regular quarterly, \$1.50 per share, payable Feb. 24.
The Niles-Bement-Pond Company, quarterly, 3 per cent, payable March 20, and regular quarterly, 1 1/2 per cent on the preferred stock, payable Feb. 20.
The Pratt & Whitney Company, regular quarterly, 1 1/2 per cent on the preferred stock, payable Feb. 20.
The Studebaker Corporation, quarterly, 2 1/2 per cent on the common stock, and regular quarterly, 1 1/4 per cent on the preferred stock, both payable March 1.

The Tropenas Converter Company, Brooklyn, N. Y., furnished the cupola, converter, blowers, piping, ladles and foundry equipment for the new converter foundry of the Otis Steel Company, Cleveland, Ohio, described in THE IRON AGE of Feb. 8.

To Push Construction Machinery Exports

A new subsidiary known as the Allied Construction Machinery Corporation has been formed by the American International Corporation, 120 Broadway, New York, to introduce American labor-saving construction machinery in foreign countries. It will have its headquarters in New York and will establish branches abroad. It will introduce the kind of machinery commonly known in this country as contractors' plant and equipment. This includes concrete mixing and distributing plants, derricks, air compressors, hoisting engines, power shovels, roadbuilding machinery, trench digging machines, light railways, etc. Although this line has been developed to a high state here, at present much of it is not used at all abroad.

R. P. Tinsley, secretary and treasurer of the American International Corporation, has been elected president and S. T. Henry, until Feb. 1 second vice-president of the McGraw Publishing Company, New York, has been elected vice-president and general manager.

An especially good field for this equipment, it is considered, are the war-torn regions in Europe, particularly in France. Most of the manufacturing centers of that country, moreover, have been seized by invasion, compelling French manufacturers to immediately re-establish their industries elsewhere. It has been pointed out that European nations have bought American labor-saving machinery for the manufacture of war munitions and it is expected that in reconstruction work they will resort to the same source. Other excellent markets are open, such as, for instance, in the reconstruction of large and rapidly expanding cities in other parts of the world. In Buenos Aires, Argentina, \$130,000,000 gold was spent in building in 1913.

Union Switch & Signal Plant Burned

Practically the entire plant of the Union Switch & Signal Company at Swissvale, Pittsburgh, was destroyed by fire on Saturday night, Feb. 10. The only part of the plant saved was a detached building in which munitions were made. Orders booked for signaling apparatus and other products would have taken the entire output for some months, and the estimated loss is \$4,000,000 to \$4,500,000. A. L. Humphrey, president of the company, states that arrangements have been made with three other concerns making the same lines of products, by which his company, with its own men, will operate those plants at night, and in this way will be able to take care of its orders to a considerable extent. There is no thought of a merger, the company operating these works through the courtesy of the owners. A meeting of the directors was held in Pittsburgh on Wednesday to discuss plans for rebuilding. Tentatively these are for three four-story fireproof buildings of a capacity 50 per cent greater than the single building destroyed by fire. The company is using all endeavors to find employment for every man thrown idle because of the fire.

Chandler & Farquhar Business Divided

On Feb. 1, by mutual agreement of the directors and stockholders of the Chandler & Farquhar Company, Boston, Mass., it was decided to separate the machinists' tool and supply department and the machine-tool department. This was made desirable on account of the large growth of the two branches of the business in the last few years, and the desire of Charles S. Farquhar to be gradually relieved from the full activities of business. The machinists' tool and supply department, located at 32-38 Federal Street, will continue under the original name and same general management, Mr. Farquhar retaining his position as president and treasurer, and F. Alexander Chandler and Walter A. Dow will be the managing directors. The machine-tool department, located at 419-425 Atlantic Avenue, will continue, but as the Lynd-Farquhar Company, Mr. Farquhar assuming the positions of treasurer and financial manager, with Robert J. Lynd as president and general manager, and Harold F. Furber as secretary. Under the reorganized conditions each branch of the business will be continued with practically the same organization as heretofore.

Steel Foundries in Chester District Expanding

Steel foundries in the Chester, Pa., district are probably more prosperous now than ever before. This is true at least so far as orders go. Including the plants at New Castle, Del., there are 7 open-hearth and three converter foundries, and each is booked to capacity. The great influx of locomotive and ship work as well as orders for machine-tool castings makes up the bulk of the work. One foundry has orders for nearly 1500 locomotive frames, another is busy on army ordnance castings besides its regular ship work, and another is pressed with specifications on castings for Government vessels.

Three of the large foundries are now making cast-steel shell blanks, similar to those described in THE IRON AGE of Jan. 4, 1917, one plant operating its full open-hearth capacity, the surplus metal being put into shell steel. The question of sulphur and copper content in connection with these shells and with regular railroad and other specifications is causing some concern. A low copper content is insisted on in the shell steel and the present rather abnormal sulphur content of the average run of pig iron tends to raise the sulphur in the final steel. One large foundry has a strike of its molders to contend with and is operating consequently at about 50 per cent capacity.

The Penn Seaboard Steel Corporation is about to add three 25-ton acid open-hearth furnaces to its Baldt plant at New Castle, Del., and two 25-ton acid open-hearth furnaces to its new plant at New Haven, Conn. This will make six furnaces at the former plant and four at the latter, doubling the capacity at each plant. Practically nothing but shell ingots will be the product in each case.

The Federal Steel Foundry, Chester, Pa., is adding 100 ft. to its main building and will soon build one 25-ton basic open-hearth furnace, making three in all. This plant is owned and operated by the William Cramp & Sons Ship & Engine Building Company, Philadelphia.

The Deemer Steel Casting Company, New Castle, Del., has awarded contract to the Belmont Iron Works, Philadelphia, for the construction of an addition to its foundry, 42 x 120 ft., of steel construction; a chipping shop, 50 x 125 ft., of concrete, and a receiving and stock room, 30 x 120 ft., to cost in all about \$30,000. The 3½-ton traveling cranes will be installed in the chipping shop. Additional equipment is needed. The enlargement will increase the capacity about two and one-half times.

Annual Meeting of American Brass Company

At the annual meeting of the American Brass Company, Waterbury, Conn., held Feb. 6, the resignation of George E. Cole as assistant treasurer and auditor was reluctantly accepted. Mr. Cole went to the American Brass Company from the Coe Brass Company, Torrington, and had completed 25 years in the business.

The directors elected the following officers: Charles F. Brooker, president; John A. Coe, Jr., Edward L. Frisbie, John P. Elton and Thomas B. Kent, executive vice-presidents; John P. Elton, treasurer; Gordon W. Burnham, secretary; C. F. Hollister, assistant treasurer; Franklin E. Weaver, assistant secretary. The appointive vice-presidents in charge of the various branches of the company are as follows: F. L. Braman, Coe Brass, Torrington; H. M. Steele, Waterbury Brass Branch, Waterbury; William A. Cowles, Ansonia branches, Ansonia; Arthur S. Brown, Ansonia branches, Ansonia; George H. Allen, Kenosha branch, Kenosha, Wis.

The receivership of the Mayo Radiator Company, New Haven, Conn., has been terminated and the company reorganized. The stockholders voted to reduce the capital from \$2,000,000 to \$1,000,000. Virginius St. J. Mayo becomes president and treasurer and Carleton E. Hoadley, secretary. Mr. Mayo succeeds James D. Livingston as president and Thomas J. Leavens, New York, as treasurer.

The Cold Galvanizing Company, Cleveland, is in the market for three 5 to 10-ton electric furnaces for melting iron and steel.

Machinery Markets and News of the Works

EXPORT SHIPMENTS HALTED

Possible War Move Creates Anxiety

Pacific Coast Not Affected—Domestic Trade Consists of Scattered Demand—General Electric Places Large Orders

The intensified activity of German submarines has caused a slackening in the placing of machine-tool orders for export. Manufacturers are watching the situation closely and the possibility of industry going on a war footing has injected a spirit of caution both in the acceptance and in the placing of new business. So far the distant West and Pacific coast regions have not felt these influences.

At Cincinnati an improved demand from the railroads has made a timely appearance to offset this condition, and the steel fabricating plants and the rolling mills are also proving good customers.

Car shortage and the scarcity of coal are now seriously holding up business in the Detroit district. In addition it is recognized there that Government control of operations would mean a change of equipment needs and this is delaying contemplated purchases of machinery.

While awaiting some definite announcement of measures to protect shipping, exporters at New York are naturally solicitous for the future of their trade. The belief is quite general that a well-established sea lane free from U-boats would even increase shipments abroad beyond what they were before the drastic sea warfare was announced.

The domestic markets show an active demand for all kinds of tools, a great deal of the business being for single tools, as for some time past.

The increasing pressure of the shipbuilding yards in the Pacific Northwest is reflected by the heavy demand by these plants, notably at Chicago, where substantial orders have been placed for special plate and structural units.

The General Electric Company is buying machine-shop and foundry equipment heavily for delivery at Schenectady and Erie, and is in the market for others of its shops.

It is reported that \$250,000 has been allotted by the Navy Department for the purchase of machine tools to put the Puget Sound Navy Yard in shape to handle ship-building work.

New York

NEW YORK, Feb. 14, 1917.

Houses exporting machinery are giving deep thought to the destruction of shipping by Germany's submarines, and it goes without saying that they are worried over the situation, although they have not as yet suffered much actual harm. Their chief worry is over what the future will bring, and they are anxiously awaiting announcements of some definite course for the protection of shipping in which it is believed the United States may lend a hand. It is the opinion of many that, should a well-guarded lane be established across the Atlantic, exports will be materially increased over what

they were prior to the announcement that a ruthless submarine warfare would be waged. Shippers to French ports, notably Bordeaux, seem to be less concerned than those who ship to English ports, as they hold to the belief that Germany's anger is directed principally against Great Britain.

Machinery intended for the Scandinavian countries has for some time been held up at the port of New York because of inability to obtain shipping licenses from Great Britain, but these suspensions of shipment are regarded as minor as compared with what may happen if sailings to Great Britain, France and Italy, as well as to Russia, are held up for any considerable time. A backing up of shipments that might easily cause a congestion might ensue. Meanwhile the larger corporations which buy for export have placed big orders, despite existing conditions.

The General Electric Company has placed additional orders for machine tools and foundry equipment for delivery at Erie, Pa., and Schenectady, N. Y. Many of the tools are large and heavy machines. A large part of the company's requirements remain unsatisfied.

Manufacturers throughout this territory continue to place orders at a lively rate, but mostly for single machines.

The Shepard Electric Crane & Hoist Company, Montour Falls, N. Y., will construct an additional bay along each side of its structural shop, each 45 x 210 ft., one to be used as a punching and shearing department, the other bay for a smith and machine shop, tool storage, etc. It will install a 10-ton two-trolley yard crane of 80-ft. span at the end of its structural shop. To its other machine shop west of the railroad it will build an extension, 35 x 200 ft., along the entire side, to be used for a storeroom and it will also add a 100-ft. extension to the power house. A portion of the present boiler room will be converted into a tool forging and hardening plant and the present drafting room and storeroom will be also added to the toolroom department. New equipment will be added, including one 250-hp. boiler, one 300-hp. uniflow engine direct-connected to a 200-kw. generator. The total capacity of the power plant will ultimately be 1500 hp. of boiler and 2000 hp. engine power. Other additional equipment will include plate straightening rolls, bending rolls, angle and plate shear, a double-end punching machine, and about 15 overhead electric traveling cranes.

The George C. Moon Company, manufacturer of wire rope, 124 White Street, New York, has increased its capital stock from \$50,000 to \$200,000 to meet the rapid expansion of its business, which has made it necessary to practically triple the size of its plant. Preparations are now being made to do this as rapidly as machinery can be obtained. New buildings are being erected to take care of the increase, which it is hoped to make productive early in spring. George C. Moon is general manager. The company's works are at Garwood, N. J.

The DuBois Piston Ring Company, with temporary offices at 118 Hudson Avenue, Albany, N. Y., manufacturer of piston rings for motors, has established its plant in part of the Albany Industrial Building. George T. DuBois is president and general manager. William E. Foskett is vice-president, Alvert A. Franklin is secretary and sales manager, and Frank E. Fitch is treasurer.

Recent increases in capital stock reported by the Secretary of State, Albany, N. Y., are as follows: The Pathe Freres Phonograph Company, 29 West Thirty-eighth Street, New York, \$1,300,000 to \$1,900,000; the Buffalo Nipple & Machine Company, Buffalo, \$30,000 to \$75,000; the Laminated Shim Company, 533 Canal Street, New York, \$5,000 to \$100,000; the Massey Machine Company, Watertown, N. Y., \$60,000 to \$100,000; the Acorn Insulated Wire Company, 77 Richards Street, Brooklyn, \$25,000 to \$60,000; the Shur-Loc Elevator Safety Company, 63 Park Row, New York, \$200,000 to \$300,000; the Deslauriers Column Mould Company, 320 Broadway, New York, \$25,000 to \$200,000.

The recent fire at the plant of the Forsyth Metal Goods Company, 308 The Terrace, Buffalo, caused the company a loss of \$14,500. It is now operating its plant at about 75 per cent capacity and expects to have it in full operation in the next ten days. The company is erecting new factory buildings at East Aurora, and will have the first of them completed about April 1, which will then increase its capacity fully 100 per cent. The company manufactures dies, tools, sheet-metal stampings, bicycle accessories and household specialties. H. J. McCauley is president.

The Acorn Insulated Wire Company, 77 Richards Street, Brooklyn, has increased its capital stock from \$25,000 to \$60,000 in order to finance the installation of machinery in a new unit of its plant, and chiefly to secure considerable raw material which it has purchased to guard against a possible shortage due to international complications. W. R. Proner is president.

The Deslauriers Column Mould Company, 320 Broadway, New York, manufacturer of adjustable steel molds for concrete construction, has increased its capital stock from \$25,000 to \$200,000 in order to increase its output. The company's main plant is at St. Paul, Minn. Henry A. Dahlen is president.

The Pathe Freres Phonograph Company, 29 West Thirty-eighth Street, New York, has increased its capital stock from \$1,300,000 to \$1,900,000 in order to meet its need of an increased producing capacity.

The Universal Conveying Machinery Corporation, 120 Broadway, New York, has been incorporated with a capital stock of \$1,500,000 by L. B. Case, A. F. Upson and P. Crichton.

The Lutz Motor Company, Buffalo, N. Y., has been recently incorporated with a capital stock of \$200,000 by L. R. Lupton, G. H. Lutz and J. H. McLean, 285 Delaware Avenue, and has established temporary offices at 15 Dun Building, Buffalo. It is planning the manufacture of a steam automobile, but is not yet ready to make public its plans.

The Thomas-Morse Aircraft Corporation has been incorporated with a capital stock of \$400,000 to take over the business of the Thomas Brothers Aeroplane Company and the Thomas Aeromotor Company, both of Ithaca, which have been voluntarily dissolved. The company will start business with \$200,000 paid in, and will manufacture airships, aeroplanes and hydroplanes, motors, engines and devices. In the near future the motors will be manufactured in additional room that will be provided by the Morse Chain Company. The new company will have a considerable volume of business transferred from the old companies, consisting largely of orders for planes and motors from the United States Government. It is planned to quickly increase the facilities by erecting new buildings to be equipped with special machinery for the manufacture of both motors and planes. The organizations of the retiring companies will be retained under the personal direction of F. L. Morse, president and treasurer of the Morse Chain Company, Ithaca, who will be president of the new company. William T. Thomas, formerly president of the Thomas companies, will be vice-president, and B. Douglas Thomas will continue as chief engineer in the department of aeroplane design. Jerome A. Fried, general manager of the Thomas Aeromotor Company in the past, will act as secretary and treasurer. Raymond Ware, formerly in charge of sales of both airplanes and aero-engines, will continue in this capacity and also have general supervision of advertising. Plans are going rapidly forward for the building of new types of airplanes particularly suited for military and naval purposes. Harold N. Bliss will be in charge of manufacturing and George H. Abel will continue as chief engineer.

The Bureau of Sewers, 215 Montague Street, Brooklyn, N. Y., will receive bids until 11 a. m., Feb. 21, for sewage pumping equipment.

The Selden Motor Vehicle Company, manufacturer of motor trucks, Rochester, N. Y., will erect a one-story brick addition covering about 12,000 sq. ft. floor space, and costing \$17,000, to take care of increased business. S. P. Gould is secretary.

The Massey Machine Company, Watertown, N. Y., manufacturer of governors for engines, recently increased its capital stock from \$60,000 to \$100,000, to provide additional facilities for the manufacture of a smaller type of governor which it has recently brought out, as well as to provide for an increase in its standard line. F. L. Massey is treasurer.

The Strong Steel Foundry Company, Norris and Hertel avenues, Buffalo, N. Y., manufacturer of acid open-hearth and alloy steel castings, will in a few days complete an addition to its foundry, 80 x 120 ft., at a cost of \$16,000. It will be used to increase the output of its regular lines. It has purchased a 25-ton crane, a large saw, some swing grinders and other equipment. O. H. P. Champlin is president and treasurer; A. A. Berrick is vice-president, and James E. Keller is secretary. The officers, with Alvin W. Day and O. H. P. Champlin, Jr., constitute the board of directors.

Simon Rosen & Son, agents, Vladivostok, Siberia, desire to represent American manufacturers, particularly of machinery and tools, in which lines they specialize. They report that many Siberian and Russian mining operators are seeking labor-saving equipment from this country. At the present time a number of these properties are also on the market, on account of lack of capital and equipment or owing to enemy ownership. Business will be contracted for one-

third cash with order, balance against the documents. They maintain a warehouse in Vladivostok and branch offices in Kobe, Japan, and Harbin, Manchuria.

The Continental Can Company, Syracuse, N. Y., is to build a three-story addition, 30 x 70 ft., to its plant. Plans have been completed. James O'Neill, 1016 East Water Street, is the purchasing agent.

The Newark Tube & Metal Works, Millbrook, N. Y., has been incorporated with a capital stock of \$377,500, to manufacture metal tubes and rods. W. C. Allen, 501 Gramatan Avenue, Mt. Vernon, H. S. Berford, 142 Columbia Heights, and J. G. Erhardt, 580 Tenth Street, Brooklyn, are the incorporators.

The Coldwell Lawnmower Company, Newburgh, N. Y., has plans in progress for erection of a foundry building, 62 x 240 ft., one story.

The Economy Devices Corporation, Hornell, N. Y., has filed articles of incorporation, with a capital stock of \$1,000,000 to manufacture special devices for use in the operation of railroad and steamship lines. The incorporators are A. R. Palmer, Madison, N. J.; H. G. Wenzel, Jr., 2 Ferry Street, Woodhaven, and F. R. Series, East Orange, N. J.

The Quasi-Arc Weltrode Company, West Nyack, N. Y., has been incorporated, with a capital stock of \$150,000, to manufacture electrodes, etc. F. W. Gordon, D. C. Alexander, Jr., 61 Broadway, and W. Moffat, 150 Nassau Street, New York, are the incorporators.

The Dodge Steel Pulley Corporation, Onelda, N. Y., has filed articles of incorporation to manufacture cast steel, structural and malleable articles. C. F. Morse, M. W. Mix and W. A. Mackenzie, Syracuse, N. Y., are the incorporators.

McCleary, Wallin & Crouse, Amsterdam, N. Y., will erect additional factory buildings, five stories in height.

The Jamestown Auto Parts Mfg. Company, Jamestown, N. Y., is taking bids on a two-story factory, 80 x 1207 ft., of brick and steel. Oscar Lenna is president.

The Wright-Hibbard Industrial Electric Truck Company, Buffalo, has been incorporated with a capital stock of \$300,000, by R. F. Hibbard, G. A. and W. H. Wright, 48 South Division Street.

The Precision Tool & Machine Company, Newark, N. J., has leased a section of the Morris Building on Scott Street for the manufacture of its specialties.

The General Lead Batteries Company, Newark, N. J., has acquired a one-story brick structure, 60 x 175 ft., adjoining its plant at the foot of Chapel Street, to be used as an addition. Minor C. Kieth is president.

The Upson-Walton Company, 291 Broadway, New York, manufacturer of wire rope and cables, with plant at Cleveland, has filed plans for its proposed plant at 462-4 Riverside Avenue, Newark, N. J. The structure will be two-stories, 54 x 148 ft., estimated to cost \$18,000.

Gould & Eberhardt, 111 New Jersey Railroad Avenue, Newark, N. J., manufacturer of machine tools, is making rapid progress in the construction of its new plant near Chancellor Avenue, Irvington. The new building will be one story, 260 x 520 ft. The company is employing about 700 hands in two 8-hr. shifts at its present plant.

The Crucible Steel Company, Harrison, N. J., has filed plans for the erection of a new one-story addition, 156 x 706 ft., to its plant, between Fourth and Sixth streets, to be used as a hammer shop. The structure is estimated to cost \$400,000.

Reuther Brothers, Harrison, N. J., operating a foundry at 415 Middlesex Street, for the production of gray-iron castings, has awarded contract for the erection of a new plant to comprise three buildings on Seventh Street. Each structure will be two stories, with main foundry 60 x 170 ft., and other buildings 24 x 150 ft., and 20 x 60 ft., respectively. Henry D. Scudder, Jr., Newark, is architect. Equipment has been purchased.

The General Electric Company, Harrison, N. J., is building a four-story, reinforced-concrete addition to its Edison Lamp Works plant on Sussex Street, 135 x 193 ft., estimated to cost \$300,000. The company has also had plans prepared for a three-story addition, 93 x 152 ft., to its plant in the vicinity of Ampere, to cost about \$100,000.

Plans have been prepared for the first units of the proposed new automobile plant to be erected by the Ford Motor Car Company, Detroit, on its 80-acre tract recently acquired on the meadows, Kearny, N. J. It is said that the initial plant will have a capacity of 300 automobiles a day, and is estimated to cost over \$1,000,000. Contract has been awarded for the construction of a 1000-ft. bulkhead on the Hackensack River, upon which the property fronts, to the Foundation Company, New York City.

The Simplex Scallop Cutting Machine Company, Elizabeth, N. J., has been incorporated with a capital stock of \$25,000.

John Tisch, 452 Spring Street, Elizabeth, Amanda Tisch and A. Keller are the incorporators.

Fire Feb. 3 destroyed the plant of the International Pipe Cleaner Company, Francis Street and Hudson Avenue, Union Hill, N. J., with loss estimated at \$50,000.

The New Jersey Quilting Company, Jersey City, N. J., has been incorporated with a capital of \$20,000 to manufacture quilting machinery. O. S. Burr, V. C. Bogardus and H. H. Walker are the incorporators.

Thomas A. Edison, Inc., West Orange, N. J., has filed plans for a factory addition to its plant at Bloomfield to cost about \$6,500.

The Kent Motors Corporation, Belleville, N. J., has filed plans for a new building, 50 x 200 ft., to be erected at its automobile factory now in course of construction.

The Ryder-Dickman Company, Red Bank, N. J., has been incorporated with a capital of \$10,000, to operate a boat-building plant. Frank P. Dickman and E. W. Dickman, Red Bank, and Harry L. Ryder, South Orange, are the incorporators.

The Steel Equipment Corporation, Rahway, N. J., is remodeling the former plant of the Rahway Steel Works, near the Perth Amboy junction of the Pennsylvania Railroad, to be used as a manufacturing plant.

The Standard Shipbuilding Corporation, 44 Whitehall Street, New York, has filed foundation plans for a new plate shop addition to its plant on Shooters Island in Newark Bay.

Catalogs Wanted

The Universal Milking Machine Company, Cattaraugus, N. Y., has been incorporated with a capital stock of \$20,000 to manufacture mechanical cow milkers. It is starting operations in a small plant and has covered its present machinery requirements. It will probably be in need of more machinery and will be glad to receive catalogs from manufacturers of lathes, milling machines, etc., also from dealers in brass and copper sheets and tubing. M. W. Cook is president; N. S. Nichols, vice-president, and J. G. Nichols, secretary and treasurer.

New England

BOSTON, MASS., Feb. 13, 1917.

It has been announced that the Southern New England Railway, a subsidiary of the Grand Trunk Railway, which will extend from Palmer, Mass., to Providence, R. I., will be pushed through to completion as soon as the weather will permit. This project was dropped for financial reasons in 1912 after \$6,000,000 had been expended on the right-of-way and grading. Officials of the Southern New England have recently been in consultation with the mayor and city engineer of Providence in regard to the five piers which the city is to build at Field's Point as a part of the project. It is expected that these piers will cost between \$800,000 and \$1,000,000.

The Langelier Mfg. Company, Providence, R. I., has purchased land at Garfield and New Depot avenues, Cranston, R. I. It has had plans drawn for a factory, 165 x 180 ft., one and two stories.

The Blue Ribbon Body Company, Bridgeport, Conn., has been incorporated with authorized capital stock of \$500,000 to manufacture automobile bodies. It will begin business with \$254,400. The incorporators are E. A. Godfrey, George H. Woods and L. J. Godfrey, all of Bridgeport.

The Square Deal Foundry Corporation, Greenwich, Conn., has been incorporated with a capital stock of \$5,000 by Herbert J., Herbert J., Jr., and Katherine Oarr.

The Worcester Metal Stamping Company, 9 Hunt Street, Worcester, Mass., has awarded a contract for a factory, 100 x 100 ft., one story.

The National Counting Machine Company, Chicopee, Mass., has been incorporated with capital stock of \$10,000. The directors are F. D. Howard, president; Lewis I. Howard, Chicopee Falls, treasurer, and R. D. Whipple.

The American Steel & Wire Company, Worcester, Mass., is building an addition to one of its buildings on Millbury Street to be used as a machine shop. It will be 20 x 100 ft., two stories.

The Olson Mfg. Company, Worcester, Mass., has been incorporated with capital stock of \$25,000 to manufacture metal goods. The directors are Robert C. Olson, 44 Andover Street, Worcester, president and treasurer; R. F. Olson and H. P. Olson.

The Draper Company, Hopedale, Mass., has awarded a contract for an addition, 79 x 109 ft., four stories.

The Autocraft Corporation, Boston, Mass., has been in-

corporated, with authorized capital stock of \$450,000 to manufacture spring wheels and other devices. The directors are: Judd Dewey, president; George G. Hinsdale, 905 Tremont Building, Boston, treasurer; and H. K. Newman.

The Rockwell-Drake Corporation, Plainville, Conn., has increased its capital stock from \$350,000 to \$370,000 for plant extension.

The Driscoll Wire Company, Huntington, Conn., has been organized with \$30,000 paid in. Edward E. Gardner is president; John E. Driscoll, vice-president; William F. Driscoll, treasurer, and Charles Marvin, secretary.

The Dunbar Brothers Company, Bristol, Conn., has awarded a contract for two additions to its plant. One, 40 x 100 ft., two stories, will be used for the manufacture of the larger sizes of flat springs; the other, 40 x 40 ft., two stories, will house the grinding department.

The Atwater Mfg. Company, Plantsville, Conn., is contemplating the erection of an addition to its forge shop and the installation of several drop hammers.

The Franklin Electric Company, Middletown, Conn., has purchased recently several lots of land adjoining its plant on Hamlin Street and has plans for expansion of the plant which will double its present force of employees.

The Providence Auto Equipment Company, Providence, R. I., has been incorporated with a capital stock of \$60,000 by Arthur M. Allen and Francis F. Kellogg of Providence and Stuart Montgomery of Boston.

The Bristol Brass Company, Bristol, Conn., is planning to build an addition, 100 x 120 ft., to its casting shop, and another factory building, 100 x 100 ft., this spring. It also contemplates erecting about 70 more houses for its employees, similar to those built the past year.

The Ludington Machine Company, Waterbury, Conn., has been incorporated with capital of \$350,000 to manufacture machinery and tobacco products. The incorporators are F. E. Ludington, E. V. Ludington and H. G. Reynolds.

The Pratt-Read Player Action Company, Deep River, Conn., has increased its capital stock from \$100,000 to \$200,000.

The contract has been awarded by the Hartford Industrial Development Company, Hartford, Conn., for a factory, 50 x 317 ft., four stories, and 64 x 64 ft., one story, which is to be occupied by the Underwood Computing Machine Company.

The Parsons Foundry Company, Bridgeport, Conn., is having plans drawn by Fletcher-Thompson, Inc., for an addition to its plant on Housatonic Avenue.

The Simplex Tool Company, Woonsocket, R. I., has been incorporated with a capital stock of \$50,000 by Thomas Shaw, 31 Hamlet Avenue; Fred L. Cleveland, 65 Social Street, Woonsocket, and George W. Greene, North Smithfield.

The Economy Appliance Company, Marlboro, Mass., has been incorporated with a capital stock of \$500,000 to make gas and electric appliances. The directors are Benjamin E. Larned, president; Joseph W. Matthews, 109 Prescott Street, Worcester, treasurer, and Thomas A. McAvoy.

The Taunton-New Bedford Copper Company, New Bedford, Mass., is having plans drawn for a new plant to replace the one recently destroyed by fire. C. A. Cook is vice-president and treasurer.

The National Rotary Oil Burner Company, Boston, Mass., has been incorporated with a capital stock of \$50,000. The directors are John H. Blanchard, president; John A. W. Silver, 541 Shirley Street, Winthrop, treasurer, and R. C. Cann.

The Burgess Company, Marblehead, Mass., will turn out one aeroplane a day for the United States Government, if present plans are carried out. The new machines are 90-hp. war biplanes with a speed of 60 miles per hour and are armored and mount guns.

The Snell Mfg. Company, Fiskdale, Mass., has suffered a \$20,000 loss by the burning of its forge shop, which will be rebuilt at once.

The Lake Torpedo Boat Company, Bridgeport, Conn., has placed a \$2,000,000 mortgage with the City National Bank. It covers the plant, patents and several submarines in process of construction. It is reported that the money is needed as working capital to complete the many contracts it has in hand.

The Economy Furnace Company, 12-14 School Street, Chicopee, Mass., has begun the manufacture of oil and gas furnaces, oil and gas burners, blowers, compressors, fuel oil plants, quenching systems, and oil pumps and tanks. The company was recently formed by W. P. Boyle, Springfield, and D. G. Canty, 120 Hampden Street, Chicopee.

Philadelphia

PHILADELPHIA, PA., Feb. 13, 1917.

The Perpetual Spark Plug Company, Dunmore, Pa., incorporated last June, has had plans prepared by Duckworth Brothers for a two-story plant, 30 x 174 ft. It is manufacturing 1500 spark plugs per day in a small plant at 326 East Drinker Street. The new works will have a daily capacity of 30,000 spark plugs and will be equipped with automatic machines and endless belt conveyors. Several hundred workers will be employed.

The General Engineering Company, Philadelphia, operating machine repair works on South Front Street, has acquired property at 713-727 South Front Street, including a shop and factory to be used in connection with its plant.

The Frankford Arsenal, Philadelphia, is receiving bids for the erection of a new artillery case shop and additions to the instrument buildings.

Fred A. Havens, 845 North Nineteenth Street, Philadelphia, has submitted a low bid for a new power house at the Erie Avenue yards of the Philadelphia & Reading Railroad, at a cost of \$38,400.

Mordecai Jefferson, Philadelphia, formerly connected with Edward Jefferson & Brother, has organized the Jefferson Machinery Company to specialize in textile machinery. Offices have been established in the Denckla Building.

The Dold-Walls Company, Inc., Philadelphia, has been organized with a capital of \$25,000 to manufacture kitchen utensils. Edwin P. Dodd, Narberth, Pa., is president of the company.

H. G. Steelman, C. P. Cannon and C. L. Dambly, Philadelphia, have incorporated in Delaware the Fort Mifflin Shipbuilding Company with a capital of \$10,000,000, to operate a shipbuilding plant at Fort Mifflin.

The John A. Roebling's Sons Company, Trenton, N. J., manufacturer of wire and wire rope, will build two additions to its plant at Canal and Elmer streets. The structures will be of brick and steel, each graduated in height from one to three stories, 95 x 594 ft., and 89 x 308 ft., to cost \$135,000 and \$120,000 respectively.

The Wetzel Mechanical Stoker Company, 26 West State Street, Trenton, N. J., has been incorporated with a capital of \$200,000 to manufacture mechanical stokers and other power plant equipment. James R. Barber, M. P. and E. Swartz are the incorporators.

The Westinghouse Lamp Company, 165 Broadway, New York, has awarded a contract for the erection of its new lamp manufacturing plant on property recently acquired on Pennington Avenue, Trenton, N. J. The initial structure will be four stories, of reinforced concrete, 80 x 500 ft., providing a floor area of 200,000 sq. ft. The plant will have a capacity of about 50,000 lamps per day, employ about 500 persons, and, with equipment, is estimated to cost \$1,000,000. The Stone & Webster Engineering Corporation, Boston, is the contractor.

The Wilckes-Martin-Wilckes Company, Pine Street and Cooper's Creek, Camden, N. J., has been incorporated with a capital of \$500,000 to manufacture graphite specialties, lamp and carbon blacks, and kindred products. F. Wilckes and L. Martin are the incorporators. A. Malstrom is agent.

James B. Strain, Chester, Pa., is organizing the Hook Foundry Company with a capital of \$50,000. A site of about two acres has been acquired at Marcus Hook for the erection of a gray-iron foundry, to specialize in castings for shipbuilding. It is said that 200 men will be employed for initial operations. Thomas Powers, Elkton, Md., is also active in the company.

S. C. Seymour, Camden, N. J., has incorporated in Delaware the Standard Auto Heating Company, with capital stock of \$250,000, to manufacture automobile accessories. George H. B. Martin, Camden, and F. R. Hansell, Philadelphia, are also incorporators.

The United States Gauge Company, Sellersville, Pa., will increase the capacity of its plant in the North Penn district.

Fire Feb. 5 destroyed the plant of the Beckman Mangler Roller Company, Coudersport, Pa., with a loss estimated at \$65,000.

Additions to be made at the Knickerbocker coal plant of the Reading Coal & Iron Company, Mahanoy City, Pa., will include an electric power plant for light and power service.

The Electric Metal Plating & Finishing Company, Rittersville, Pa., has been organized to establish and operate a local plant.

Fire Feb. 4 destroyed one of the buildings of the plant of the American Car & Foundry Company, Berwick, Pa., with a loss estimated at \$125,000. The structure was two stories, 60 x 100 ft.

The Dartt Carriage & Automobile Company, Wellsboro,

Pa., has been incorporated with a capital of \$25,000 to manufacture carriage and automobile parts. Robert R. Dartt is president.

The Sterling Metal Company, Carbondale, Pa., has been incorporated with a capital of \$10,000. Joseph L. Lee is president.

A. J. Haws & Son, Ltd., Johnstown, Pa., has commenced excavation for a ganister brick manufacturing plant at Lewistown, Pa.

The Allen Motor Company, Allentown, Pa., is planning for the erection of a garage and repair shop, 150 x 170 ft., at Bethlehem.

Baltimore

BALTIMORE, Md., Feb. 13, 1917.

The Pusey & Jones Company, shipbuilder and manufacturer of paper-making machinery, Wilmington, Del., will double its present capacity. It has taken out permits for two new buildings to cost in all about \$100,000. Contracts have been awarded to George F. Pawling & Co., 1432 South Penn Square, Philadelphia, for the construction of one building, 60 x 323 ft., to cost \$70,000, and another building, 62 x 109 ft., to cost \$30,000, both to be added to its shops.

The Jones Hollow Ware Company, Forrest and Madison streets, Baltimore, will use premises at Montford Avenue and the Pennsylvania Railroad as a wood-working factory.

The International Wood & Paper Products Corporation, 117 North Calverton Road, Baltimore, has asked for bids on the construction of a factory at Calverton Road and Lexington Street.

The Canton Company, Commerce and Water streets, Baltimore, has asked for bids for the erection of a one-story factory building at Canton, Md., for use by the Baltimore Machine & Decorating Company, 1612 Fairmount Avenue, Baltimore.

The American Refractories Company, Joliet, Ill., will locate a plant in the Curtis Bay district of Anne Arundel County, Md. The plant will turn out silica, magnesia, chrome and fire brick. B. B. Massman is secretary.

The plant of the Crisfield Machine Works, Crisfield, Md., manufacturer of gas engines, was destroyed by fire Feb. 5.

Chicago

CHICAGO, ILL., Feb. 13, 1917.

In common with shippers of other products, the machine-tool interests are confronted with most discouraging conditions of transportation. One seller reports that it has 110 lathes awaiting boat shipment at Bush Terminal, Brooklyn, N. Y., while the embargoes now effective have nearly shut off the outlet of business eastward from Chicago. Most of the railroad business in machine tools which has been pending since early December remains to be placed, but the Northern Pacific has practically closed for its requirements.

Inquiry from the manufacturing trade has been especially heavy the past ten days, and individual tool sales have been brisk. Demand for shipyard tools is noteworthy, solicitation of the now exceptionally active yards of the Pacific coast having developed a substantial business in special plate and structural steel-working equipment.

Darling & Co., 4201 South Ashland Avenue, Chicago, will erect a one-story boiler and engine house, 55x160 ft., at 4625 Packers Avenue, to cost \$35,000.

The Pullman Company, Chicago, will build a one-story brick factory at 800 East 108th Street, to cost \$225,000, and other shop additions to cost \$70,000. W. E. Ingram is the engineer.

The Iroquois Iron Company, Chicago, will build a one-story brick addition to its storage house at Ninety-fourth Street and Lake Michigan, at a cost of \$6,500.

The Zenith Mfg. Company, Chicago, has been organized with a capital of \$10,000 by Joseph R. Churan, John S. Hagberg and John J. Lupe, 155 North Clark Street.

The Marvel Scales Company, Chicago, has been incorporated with a capital of \$5,000 by Thaddeus D. Layne, Rose E. Schnem and Henry T. Martin, 343 South Dearborn Street.

The Acme Packing Company, Chicago, has purchased property at Western Avenue and Forty-third Street, and will build a two-story mill building, with provision for two additional floors. The company also plans to erect six other buildings, the total cost of which will be about \$500,000.

The Chicago Mill & Lumber Company, 900 North Sangamon Street, Chicago, has plans for a one-story and basement boiler and engine house, 54½x120 ft., to cost \$30,000. Louis Guenzel, 111 West Washington Street, is the architect.

The Standard Cap & Seal Company, 327 Wells Street, Chicago, has plans for a four-story factory, 100x150 ft., to cost \$125,000.

The Chicago Metallic Packing Company, Chicago, will build a two-story factory, 60x125 ft., to cost \$15,000. Walter Alschlager, 111 West Washington Street, is the architect.

Robert Glendinning, 2256 West Forty-ninth Street, Chicago, will erect a one-story foundry on Forty-eighth Street, near Campbell Avenue, to cost about \$20,000. The building will be leased to Van F. Ridgeway and Harry C. Quest for a term of years, and will be used for the manufacture of steel products.

The C. D. Osborn Company, 2201 Wabansia Avenue, Chicago, will build a two-story brick factory at 2207 Wabansia Avenue, to cost \$20,000.

The Industrial Mfg. Company, 408 North Sacramento Boulevard, Chicago, is constructing a machine shop, to cost \$10,000. W. Granger, 36 West Randolph Street, is the architect.

The Knapp Brothers Mfg. Company, Chicago, maker of steel specialties, has increased its capital stock from \$50,000 to \$100,000.

The Holmes, Pyott & Co. Iron Works, 159 North Jefferson Street, Chicago, has had plans prepared by H. H. Mahler, 92 Gale Avenue, River Forest, Ill., for a one-story steel-trussed machine and fabricating shop, 125x216 ft., at Campbell Avenue and Fulton Street, to cost \$35,000.

The Machine Tool & Supply Company, Davenport, Iowa, J. H. Gerdes, president, advises that it is to be the first machine tool dealer in that general section, and that it now has a large stock of tools on hand.

The Joseph F. Wangler Company, St. Louis, Mo., which is adding to its plant facilities at Litchfield, Ill., advises that eventually all of its manufacturing operations will be located there. The company will soon be a buyer of equipment.

LaSalle, Ill., is planning the expenditure of \$150,000 for new pumps and improvements to its waterworks system. E. J. Byrne is city engineer.

The McGuire-Cummings Company, Paris, Ill., will erect a one-story truck and machine shop to cost \$18,000.

The American Radiator Company, 816 South Michigan Avenue, Chicago, has plans for enlarging its plant at Litchfield, Ill., which include the erection of a machine shop and foundry.

The George G. Bayne Company, Bushnell, Ill., has plans for a factory building, 96x126 ft., to cost \$75,000. The company manufactures automobile specialties.

The Chicago Recording Scale Company, Waukegan, Ill., will erect a two-story machine shop, 38x75 ft., to cost \$6,000.

The Boone Tire & Rubber Company, Sycamore, Ill., has plans for the erection of a plant, 60x200 ft., at Chippewa Falls, Wis.

The Silo Specialty Mfg. Co., Clinton, Iowa, through its president, F. H. Douthitt, has recently purchased the entire plant and equipment of the Bushnell Tank Works of Bushnell, Ill., and the Silage King Mfg. Company of Clinton. It intends to consolidate the offices of Clinton; but will continue the operation of the Bushnell plant in connection with the Clinton factory. It expects to install quite a large number of heavy sheet metal-working machinery, lathes, etc., as it will continue to manufacture the Silage King line of ensilage cutters, potato sorters and potato warehouse equipment, as well as the Bushnell tank line of wood and steel tanks.

The Roberts-Hamilton Company, Minneapolis, Minn., will build an addition to its plant at 413 South Fourth Street. The company manufactures furnaces and boilers.

Page & Hill, Hamden and Hersey avenues, St. Paul, Minn., will build a machine and tank shop.

The Duluth Show Case Company, Duluth, Minn., is having plans prepared for a reinforced concrete factory, of which the main building will be 135x150 ft., two stories. The company has a site adjoining the Hugo Mfg. Company's plant, but is not going to build this year.

Indianapolis

INDIANAPOLIS, IND., Feb. 13, 1917.

The Perfection Dish Dryer Company, Indianapolis, has been incorporated with \$10,000 capital stock to manufacture household articles. The directors are John T. and John L. Van Zant, and M. K. Schomber.

The Ram Engineering Company, Richmond, Ind., has been incorporated with \$5,000 capital stock to manufacture metal products. The directors are Arthur Lindner, Fred D. Bethard and Wilfred Jessup.

The Reliance Mfg. Company, Michigan City, Ind., has increased its capital stock from \$1,000,000 to \$1,500,000.

The Specialty Display Case Company, Kendalville, Ind., has been incorporated with \$375,000 capital stock to manufacture show cases and other equipment. The directors are Ralph J. Keller, A. M. Jacobs and Simon J. Straus.

The Sheridan Water, Heat & Light Company, Sheridan, Ind., has applied for a permit to issue \$10,000 in bonds to build extensions to its electrical plant and for an ice storage plant.

The Warner Gear Company, Muncie, Ind., has increased its capital stock from \$500,000 to \$1,500,000.

The Marion Mattress Company, Marion, Ind., has increased its capital stock from \$20,000 to \$35,000.

The George Cutter Company, South Bend, Ind., manufacturer of outdoor electrical appliances, has issued \$300,000 of preferred stock.

The Montpelier Mfg. Company, Montpelier, Ind., has taken a contract to manufacture the new Bowser compressed air system, by which, it is said, a 10-gal. gasoline tank may be filled in 28 sec. by pressing a button.

The Automobile Dump Car Company, South Bend, Ind., has been incorporated with \$25,000 capital stock to manufacture automatic dump cars. The directors are P. C. Fergus, Mason L. Petro and A. L. Herr.

The Linton Wood Working Company, Linton, Ind., has been incorporated with \$25,000 capital stock, to manufacture articles of wood. The directors are Samuel Drennon, Chester E. Spielser and G. Hast.

The Richmond Malleable Castings Company, Richmond, Ind., has been incorporated with \$100,000 capital stock by William J. Blackmore and others.

Anderson, Ind., will install power equipment in its electric lighting plant.

The lumber plant of the C. P. White Mfg. Company, Evansville, Ind., was destroyed by fire with a loss estimated between \$50,000 and \$60,000.

The Indiana Brass Company, Frankfort, Ind., was recently incorporated with a capital stock of \$100,000, not \$10,000, as has been stated elsewhere.

Milwaukee

MILWAUKEE, WIS., Feb. 12, 1917.

The demand for milling machines shows no abatement. Orders the past week were as large as any previous period in the last few months, and continue to be for single tools or small lots, principally for domestic use. The war situation has not caused any considerable excitement, although machine-tool manufacturers as well as metal-working establishments have announced that they are ready to comply with any Government order. Requirements aside from war needs continue to make an urgent demand for machine-tools that will keep local builders busy beyond the end of the year. Deliveries show some improvement, but the car situation still works hardships on both buyers and sellers. The automobile and farm tractor industries could use a great many more machines than are available. The labor situation is considerably easier than for many months, and a plethora of semi-skilled workmen exists, due to the fact that much common labor has acquired some experience in machine shops.

The George S. Parker Pen Company, Janesville, Wis., manufacturer of fountain pens, will build a new factory and power plant costing \$75,000. Plans are being prepared by A. Arthur Guilbert, architect, Racine, Wis., for a two-story main factory, 75 x 150 ft., of brick, concrete and steel, and a separate engine and boiler house. No date has been set for taking bids.

The Belle City Mfg. Company, Racine, Wis., manufacturer of agricultural implements, is preparing for the erection of a new shop and factory unit, costing about \$45,000, of brick, concrete and steel, and located at Racine Junction. The architect is A. Arthur Guilbert, Racine.

Ottman & Larson, Ellsworth, Wis., will erect a garage and repair shop, 60 x 130 ft., one story and basement.

The Milwaukee department of public works will take bids until 10.30 a. m., Feb. 27, for furnishing two 300-hp. water-tube boilers and appurtenances for the North Point pumping station. F. G. Simmons is commissioner.

Vaughn & Meyer, consulting engineers, Milwaukee, will close bids Feb. 20, for furnishing two 400-hp. boilers, with automatic stokers, to the Marathon Paper Mills, Rothschild, Wis.

W. W. Delong & Son, architects, Appleton, Wis., are taking bids for the erection of a garage and machine-shop to cost \$8,000. The name of the owner is withheld.

The Neis-Freund Hardware Company, 7123 National Avenue, West Allis, Milwaukee, will build a sheet metal-working, machine and plumbing shop costing \$10,000 with complete equipment.

The Schweers Hardware Company, Shawano, Wis., is establishing a sheet-metal and tinware manufacturing department, which will specialize in galvanized milk cans, tank heaters and other dairy and farm equipment. D. J. Althaus is department manager.

The Jenkins Machine Company, Sheboygan, Wis., sustained a loss estimated at \$1,500 by fire resulting from a defective cupola in its foundry. Repairs are under way and there will be only a slight interruption.

The Briggs & Stratton Company, 258 Milwaukee Street, Milwaukee, maker of ignition devices and electrical goods, has increased its capital stock from \$50,000 to \$250,000. It is expending about \$100,000 in the erection of a plant on Hopkins Street, to be occupied about May 1.

The plant of the Cedarburg Foundry Company, Cedarburg, Wis., which was leased several months ago by Frank A. Walsh and Ernest Heid, West Allis, Wis., and re-opened after long idleness, has again ceased operations.

The Clinton-Burnham Foundry Company, Milwaukee, which has been inactive for several years, has filed articles of dissolution.

The LaCrosse Tractor Company, LaCrosse, Wis., the recent merger of the Sta-Rite Engine Company, LaCrosse, and the Happy Farmer Tractor Company, Minneapolis, has leased the plant formerly occupied by the Summit Stove Works at LaCrosse, to supplement its existing facilities and to enable it to attain a production of 2800 to 3000 tractors in the calendar year. The entire output has been contracted for. The main plant is located in the Sta-Rite shops, which are being enlarged.

The L. J. Anderson Company, Manitowoc, Wis., operating a machine shop in connection with its farm machinery, automobile and tractor business, has been dissolved as a corporation. Theodore O. Anderson and Henry Zinkel will continue the operation of the machine shop, repair and farm machinery business, and L. J. Anderson takes over the automobile business and garage.

The P & B Mfg. Company, 189 Fifth Street, Milwaukee, maker of electrical appliances and devices, suffered a loss of \$40,000 by fire Feb. 6. The company broke ground a few weeks ago for a new plant under the Sixteenth Street viaduct, which will be completed about May 1.

The Radcliffe Machinery Company, Wausau, Wis., has been organized with a capital stock of \$25,000 by W. W. Radcliffe, Otto Mueller, J. N. Manson and C. T. Edgar to manufacture road and farm machinery, tools, etc.

The Boone Tire Company, Sycamore, Ill., has accepted the proposition of the Progressive League of Chippewa Falls, Wis., to establish a plant in that city, on condition that local capital subscribe \$28,000. A site has been purchased and it is proposed to erect a brick and concrete factory, 60 x 200 ft., one story and basement, with saw-tooth roof. I. V. MacLean is president and general manager.

The Mars Mfg. Company, Merrill, Wis., maker of metal furniture, has contracted with the Invincible Metal Furniture Company, Manitowoc, Wis., to manufacture its goods until it is able to erect a plant of its own at Merrill. Louis A. Jiranek is manager.

The O'Leary Brothers Boiler Works, South Pearl Street, Green Bay, Wis., was damaged \$5,000 by fire Feb. 1. It has been decided to build a modern boiler and structural shop as soon as possible. Existing orders will be completed in the undamaged part of the plant.

The Weber Company, 684 Seventy-third Avenue, West Allis, Milwaukee, is taking bids for the erection of a garage and repair-shop, 60 x 90 ft., two stories and basement, costing \$10,000.

Marshfield, Wis., is negotiating with a manufacturer of boilers, paper mill machinery, digesters, etc., now located in Wisconsin on Lake Michigan, to establish a new plant involving an investment of \$30,000. Names and details are withheld for the present.

The MacFarland-Westmont Tractor Corporation, Sauk City, Wis., will begin manufacturing operations in its permanent plant, occupying the group erected for the Shaw Motor Company at Sauk City, on Feb. 15. A continuous capacity run of at least four months is provided at the works.

The West Milwaukee locomotive and car construction shops of the Chicago, Milwaukee & St. Paul Railway Company at Milwaukee, Wis., are increasing their working force about 75 per cent to take care of orders for new engines costing about \$1,000,000 and for 1550 gondola, 1070 box and 325 ore cars. A. E. Manchester is superintendent of motive power, in charge of the shops.

Detroit

DETROIT, MICH., Feb. 13, 1917

The unsettled national situation is charged by machinery dealers with the falling-off of the market. It is pointed out that in case threatened hostilities materialize the equipment of the large factories would have to be changed to a different output, and manufacturers are not ordering new machinery for this reason. The complete demoralization of freight traffic and the pronounced shortage of coal, already threatening the shut-down of many large factories, add to the unfavorable conditions. No large orders were placed the past week, and miscellaneous orders did not boost the market to normal. Delivery on all standard machines except milling machines has improved. High-grade lathes are difficult to secure, several months being required.

The Olympian Motors Company, Pontiac, Mich., which now occupies the plant constructed for the Flanders Mfg. Company, has purchased the five factory buildings of the Cartecar plant, totaling 225,000 ft. of floor space, and will take possession April 1. The company has also purchased 15 acres of adjoining land, and proposes to erect an assembling building, 100x800 ft. R. A. Palmer is president.

The Field Motor Company, Grand Rapids, Mich., has completed its organization with a capital stock of \$500,000, of which \$200,000 is paid in. An improved type of gasoline or kerosene motor, especially designed for tractors, will be manufactured. The officers are: Edward A. Field, president; John Sehler, vice-president; A. M. Noorthoek, secretary, and J. P. McVain, treasurer.

The Vassar Stamping Works, Vassar, Mich., has incorporated to manufacture automobile parts, with an authorized capital stock of \$16,500 common and \$15,000 preferred.

The Bower Rolling Bearing Company, Detroit, has increased its capital stock from \$300,000 to \$600,000.

The Independent Stove Company, Owosso, Mich., is planning a large addition to its plant.

The Simplicity Wheel Company, Grand Rapids, has been incorporated for \$40,000 by Elmer Gray, Fred B. Raymond, Frederick W. French, Louis Barth, and George Clapperton.

The Buhl Malleable Company, Detroit, has increased its capital stock from \$230,000 to \$460,000.

The Janney Aircraft Company, Monroe, Mich., has incorporated for \$30,000 to manufacture aerial craft, motor boats, dirigibles, etc.

The Dunkley Company, manufacturer of canning machinery, will erect a plant at Kalamazoo, Mich., at once.

The Wayne Tool Company, Detroit, has been incorporated for \$10,000 by George A. and Adam L. Gloor and William Schenck.

The Lakey Foundry & Machinery Company, Muskegon, Mich., has increased its capital stock from \$60,000 to \$70,000.

John Redmond and A. Hanshaw, Detroit, will establish a factory at Lapeer, Mich., to manufacture steel axles and wagon tongues.

The Paige-Detroit Motor Car Company, Detroit, has sold its plant to the Pennsylvania Railroad, and has purchased 51 acres of land at Warren Avenue and the Grand Belt Line Railroad, on which a new plant will be erected.

The Dort Motor Car Company, Flint, Mich., has increased its capital stock from \$500,000 to \$1,500,000.

The Muskegon Heights Aeroplane Company, Muskegon Heights, Mich., has been organized to manufacture a super-aeroplane. Leading Muskegon Heights manufacturers are stockholders. The aeroplane will be of the triplane type, with a spread of 72 ft., and will be equipped with two 100-hp motors. It will have a carrying capacity of two tons.

The Clough & Warren Company, operating a piano and organ factory at Adrian, Mich., and the James Manoli Company, New York, have completed the organization of the Manophone Company, to manufacture phonographs.

Plans for merging the Detroit Valve & Fittings Company and the Detroit Brass Works have been recommended by the directors of the two corporations. It is proposed to increase the authorized capital stock of the Detroit Valve & Fittings Company from \$500,000 to \$1,500,000, and distribute a 30 per cent dividend in stock to the stockholders, and to increase the authorized capital of the Detroit Brass Works from \$400,000 to \$500,000, giving the stockholders a 10 per cent dividend in stock. The Detroit Valve & Fittings Company operates a plant in Wyandotte, and the Detroit Brass Works plant is on Brooklyn Avenue and the Michigan Central Railroad, Detroit.

The Klemm Mfg. Company, Saginaw, Mich., has been incorporated with a capital stock of \$20,000, to manufacture sound reproducing machines.

The Siewek Tool & Machine Works, Detroit, has been incorporated with a capital stock of \$275,000, of which \$250,000 is paid in property. The principal stockholders are Walter J. and Otto H. Siewek.

Cincinnati

CINCINNATI, OHIO, Feb. 12, 1917.

As far as can be ascertained no rush orders for machinery for the Government were placed last week in this vicinity. Considerable work, however, which was awarded some time ago, is under way. New export orders for machine tools are scarcer, but this condition is counterbalanced by the improved domestic demand, especially from the railroads. Steel fabricating plants and the rolling mills are also good customers for equipment. The majority of both gray-iron and steel foundries were never busier, and in spite of delayed railroad shipments have been able to obtain a sufficient supply of coke to operate on full time.

The Ohio Mold & Foundry Company, Cincinnati, whose capital stock was increased from \$100,000 to \$150,000, has acquired the foundry of the Lane & Bodley Company, in Bond Hill suburb, which it will equip for making ingot molds.

The Charles McCaul Company, Cincinnati, has been awarded contract for the construction of an administration building for the American Rolling Mill Company, Middletown, Ohio, estimated to cost \$200,000.

F. A. Day & Co., Cincinnati, a new organization, plan to fit up a plant to manufacture wooden shoe heels. Only special equipment will be required.

The addition to the plant of the Maxwell Motor Car Company, Dayton, Ohio, will be of fireproof construction, estimated to cost \$50,000.

The Blackwood Steel Foundry Company, Springfield, Ohio, is having plans prepared for doubling the capacity of its plant. Work on the new office building is under way.

The Victor Rubber Company, Springfield, is preparing plans for a three-story addition to its plant, 20 x 55 ft.

The Columbus Mill & Mine Supply Company, Columbus, Ohio, have commissioned Stribling & Lunn, architects, Columbus, to prepare plans for its new plant, estimated to cost \$75,000.

The McIntyre Mfg. Company, Columbus, Ohio, manufacturer of farm tractors, has commenced the erection of its new plant.

The Hydraulic Press Mfg. Company, Mt. Gilead, Ohio, is having plans made for the erection of five manufacturing buildings in Columbus, Ohio, where it will remove as soon as its new home is completed.

The Central Ohio Dairy Company, Columbus, will erect a refrigerating plant at Nineteenth Street and Hildreth Avenue.

The Old Town Rubber Company, Xenia, Ohio, expects to increase the capacity of its plant at an early date. It is operated by water power.

The Flory Ice Company, Eaton, Ohio, expects to erect an ice plant. Part of the equipment has been bought.

It is reported that the Dayton Malleable Iron Company, Ironton, Ohio, contemplates doubling the capacity of its foundry at that point.

The National Artificial Refrigerating Company, Wapakoneta, Ohio, is building a plant for the manufacture of small and medium-sized ice-making and refrigerating machinery. Special equipment will be required and the list is also said to include a number of machine tools.

The Joseph Schonthal Iron Company, Columbus, Ohio, will remove its scrap iron plant to a seven-acre site on West Goodale Street. Additional equipment will be installed.

Cleveland

CLEVELAND, OHIO, Feb. 13, 1917.

The possibility of war with Germany is causing considerable anxiety among manufacturers, and has resulted in holding up some machine-tool business. This is also true of some projects for building new plants and extensions. Buying of small lots of machinery, however, has apparently not been affected, and dealers report a good volume of business for one or two machines. The demand for planing, milling and boring machines is heavier than for other lines. Less call is noted for lathes and drilling machines, and deliveries have eased up somewhat. A Cleveland manufacturer has taken an order for 20 automatic screw machines for shipment to England. The demand for cranes is still very active.

The Day & Maddock Company, Cleveland, has been incorporated with a capital stock of \$15,000 to take over the

business of William F. Maddock, dealer in contractors' machinery, 1210 Washington Avenue. Charles E. Day, formerly with the Pattison Supply Company, has become associated in the business.

The Woods Cushion Wheel Company, Cleveland, has been incorporated with a capital stock of \$500,000 by Edward B. Woods and others to manufacture a cushion wheel for automobiles.

The Winton Company, automobile dealer, Cleveland, has placed a contract for the erection of a two-story extension 58x191 ft.

The Empire Brass Mfg. Company, Cleveland, will build a much larger factory for the manufacture of plumbers' brass goods at 10,301 Berea Road, to take the place of the present one on Lake Avenue. The building will be 42x252 ft., and will include a foundry and finishing room. It is in the market for turret lathes, melting furnaces, molding machines, motors, and other equipment.

The Cleveland Milling Machine Company, Cleveland, will shortly begin the erection of an addition to its plant, 100x100 ft., to be used as a machine and erecting shop.

The Hoover Suction Sweeper Mfg. Company, New Berlin, Ohio, has been incorporated with a capital stock of \$50,000 to manufacture electric suction and vacuum sweepers.

The King Electric Company, Canton, Ohio, has been incorporated with a capital stock of \$30,000 to manufacture telephones and electric novelties. It is stated that a company in Pittsburg manufacturing electrical goods will be taken over.

The Brightman Hammered & Nut Mfg. Company, Sandusky, Ohio, is planning an extension to its plant, 80x150 ft.

The Dale Body Company, Fostoria, Ohio, recently organized, will build a plant to manufacture automobile bodies. L. J. Eshelman is president and M. A. Thomas, secretary and treasurer.

The Allen Motor Company, Fostoria, Ohio, will build an extension to its plant.

The National Machinery Parts Company, Toledo, has been incorporated with a capital stock of \$10,000 by Ernest Truman and others.

The Ohio Brass Company, Mansfield, Ohio, has issued \$500,000 in additional preferred stock, and it is stated that it is planning extensions to its plants in Mansfield and Barberton.

Plans for the new steel frame plant, 80x160 ft., of the Semi-Steel Foundry Company, Barberton, Ohio, have been prepared by H. Whitford Jones & Co., engineers, Citizens Building, Cleveland, and the contract will be placed shortly.

The Columbus Chain Company, Columbus, Ohio, has found it necessary to greatly enlarge its Eastern plant at Lebanon, Pa. It is erecting new buildings and installing equipment, which will greatly increase the capacity and enable it to make at Lebanon a complete line of chain from the smallest to the largest, in all qualities, especially ship cables up to the largest size. It is also adding at Lebanon, as well as at Columbus, modern testing machines of a capacity that will test the largest size chain to the requirements of any of the special bureaus.

The Central South

LOUISVILLE, KY., Feb. 13, 1917.

Despite the possibilities of war, which has caused some apprehension because of the suspended developments, signs of curtailment to business are lacking. In power and special machinery equipment lines inquiries pile up and orders are satisfactory. At least 25 new coal-mining developments were reported for the week. Shortage of coal and gas is retarding manufacturing and here and there industrial plants are suspending for short periods for lack of fuel. Labor is scarce and Eastern concerns are advertising for skilled workmen in papers hereabouts.

The Stiles Motors Company, Louisville, has been incorporated with \$20,000 capital by K. S. Stiles, J. W. DeHart and J. M. Clifford.

The Louisville Rendering Company, Louisville, has been incorporated with capital stock of \$50,000 by Fred E. Hoerter, T. M. Kremer and Karl M. Zach.

The Wirth-Lang-Borgel Company, Louisville, recently organized to manufacture store and office fixtures, has purchased the plant of the Lausberg-Macke Company, Louisville, and will improve it.

W. R. Myers and R. A. Myers, Monticello, Ky., owners of the Monticello Light & Power Company, have purchased the McKechnie mill site and will install electric generating machinery, using water power.

The Rockcastle Lumber Company, Huntington, W. Va.,

will rebuild its band sawmill at Offutt, Ky., recently burned at a loss of \$50,000.

The Herron Iron Bedstead Mfg. Company, Chattanooga, Tenn., has increased its capital from \$10,000 to \$100,000 and will extend its business.

Fire caused a loss of \$75,000 to the plant of the Green River Lumber Company, Memphis, Tenn., destroying the sawmill and planing mill. S. M. Nickey, the president, states that the plant will be rebuilt at once.

The Lauderdale Light & Power Company, Ripley, Tenn., has been incorporated with capital stock of \$20,000 by W. W. Craig, E. C. Pullock, J. M. Carney, and others.

The Gilman Paint & Varnish Company, Chattanooga, Tenn., will rebuild its factory which burned in January with a loss of \$20,000.

Birmingham

BIRMINGHAM, ALA., Feb. 12, 1917.

Machinery dealers agree that business has assumed even greater proportions than in the months of November and December; in other words, that there has been a constantly increasing volume and activity since the early fall. Coal mine apparatus, including engines, pumps and electrical appliances, are in great demand. Machine tools are not being sold in any great amount, because they cannot be had. The sawmill trade is slightly dull.

The Alabama Southern Oil Company, Mobile, Ala., has been incorporated by W. H. Lattermer of Mobile, and others, with a capital stock of \$500,000.

The Tampa Shipbuilding & Engineering Company, Tampa, Fla., Ernest Kreher president, capitalized at \$800,000, will repair and construct ships. Three 200-hp. crude-oil engines and generators and other apparatus have already been ordered. Additional machinery will be required.

The Edward Hines Lumber Company, Chicago, Ill., will build a mill at Gulfport, Miss., with a cutting capacity of 500,000 ft. per day and will employ 700 to 800 men, including a 200 x 500-ft. planing mill, a main mill, 94 x 312 ft., etc.

The Salem Iron Works, Winston-Salem, N. C., is in the market for a small vertical boring mill or chucking machine equipped with a turret head for general boring, turning and facing of small parts, such as plate couplings, flanged boxes, etc.

St. Louis

ST. LOUIS, MO., Feb. 13, 1917.

The machine-tool market has been rather quiet the past week, as a result of war complications and the possible changes of manufacture in certain eventualities. Nothing occurred, however, to indicate any less need or demand for equipment, and dealers report that they expect business to be even more pressing as soon as developments shape a definite course.

St. Louis is receiving bids for a steam-driven centrifugal pump of 100,000,000 gal. capacity, with all appurtenances, for its waterworks plant. The Board of Public Service is in charge.

The Cupples Company, St. Louis, Harry B. Wallace, president, will increase its rubber department for the manufacture of a new type of automobile tires and inner tubes.

The Acme Boiler & Sheet Iron Company, St. Louis, has been incorporated with a capital stock of \$15,000 by A. J. Getz, Frederick Jones and others, to manufacture metal products.

The St. Louis Ventilating & Sheet Metal Company, St. Louis, has been incorporated with a capital stock of \$13,000 by A. J. Schmittner, F. J. and M. A. Kettenbach, to do a general sheet metal business.

The Globe Motor Truck Company, St. Louis, has been incorporated with a capital stock of \$150,000 by Charles H. Phillips, Ernest Housman and William Carr, to manufacture motor trucks.

The General Machinery Mfg. Company, St. Louis, has been incorporated with a capital stock of \$10,000 by F. A. Mohr, E. W. Lake and J. C. Jones, Jr., to manufacture machinery.

John Meeker purchased property at the corner of Calvary Avenue and Penrose Street, St. Louis, and will erect a factory to manufacture sheet metal products.

The Mineral Refining & Chemical Corporation, St. Louis, A. F. Versen, general manager, has completed plans for the expenditure of \$1,500,000 to increase the capacity of its plant for the manufacture of chemicals, white paint pigment, etc.

J. B. Drerup, Portageville, Mo., will re-equip his electric light and power plant recently destroyed. About \$9,000 worth of machinery will be needed.

The Evans-Thwing Refining Company, Kansas City, Mo., has been incorporated with a capital stock of \$1,000,000 by Harry M. Evans and F. H. Thwing. H. G. James is general manager.

C. F. Robertson and associates have prepared plans for a hydro-electric plant at Edith, Mo., on the Niangua River, at a reported cost of about \$4,000,000.

The Way Cooperage Company, New Madrid, Mo., is reported in the market for about \$3,000 worth of wood-working machinery. M. J. Conran can be addressed.

The Little Rock Lumber & Mfg. Company, Little Rock, Ark., whose extensive plant was recently destroyed by fire, will re-equip and will require about \$50,000 worth of machinery.

The Everton Mining & Development Company, 71 West Twenty-third Street, New York City, is in the market for about \$30,000 worth of equipment for its mining operations at Everton, Ark. J. Hamilton Mobley is manager.

The Northwestern Steel & Iron Works, Little Rock, Ark., is reported in the market for cane mills, evaporator equipment, and other sugar machinery.

Plans have been drawn for the new buildings and improvements at the plant of the United Iron Works Company, Okmulgee, Okla., the estimated cost of which will be in the neighborhood of \$35,000.

The Oklahoma Producing & Refining Company, Oklahoma City, Okla., will increase its capital from \$5,000,000 to \$10,000,000 to increase its equipment and extend its operations.

The St. Louis & San Francisco Railroad, F. G. Jonah, chief engineer, St. Louis, Mo., will equip a car rebuilding and repair plant at Sapulpa, Okla.

The Mississippi Centennial Exposition Company, Gulfport, Miss., will receive bids until Feb. 21 for an electric light plant and illuminating system for the exposition grounds. A. W. Lewin, Audubon Building, New Orleans, La., is the engineer in charge.

The Edward Hines Lumber Company, Chicago, Ill., will build a lumber plant at Gulfport, Miss., the equipment to include three band saws, horizontal band resaw, gang saws, steam and electric plant, etc. The daily capacity will be 500,000 ft.

The Geier Brothers Lumber Company's plant, New Orleans, La., has been burned with a loss of \$70,000, largely on equipment which will be replaced.

The Trans-Mississippi Terminal Company, J. A. Shepherd, president, New Orleans, La., will equip a roundhouse and repair shop.

Texas

AUSTIN, TEX., Feb. 16, 1917.

The spring trade of the machinery and tool dealers of Texas is opening up with unusually fine prospects. The demand for irrigation machinery is a feature of the trade at this time.

The Hills, Sutton & White Mfg. Company, El Paso, is erecting a brick building in which it will install machinery for the manufacture of sheet-metal products.

J. W. Karbach, Lockhart, and associates will build a cotton compress to cost \$50,000. High density presses will be installed.

The Athens Pottery Company, Athens, which has been incorporated with a capital stock of \$60,000, will build a plant for the manufacture of tile and other clay products. P. F. Miller is active in the organization.

The Columbus Electric Light & Power Company, which has been organized with a capital stock of \$200,000, will build an electric power plant at Columbus, N. M., to supply the town and adjacent territory. J. L. Greenwood is the principal stockholder.

The Southern Welding & Machine Company, San Antonio, will build a new plant equipped for handling heavy and bulky castings. It will also manufacture a line of machinery. The plans call for the construction of a two-story reinforced concrete building 60 x 110 to cost \$12,000. John A. Dittman is president.

San Francisco

SAN FRANCISCO, CAL., Jan. 30, 1917.

The machine-tool trade for January has shown a slight slump, which is attributed to increased caution on the part of buyers following the jump in prices. Many feel that purchases at present prices are unwarranted, and others are holding off in hope of easier conditions. Merchants, however, express confidence that this condition will not last long, as many shops are in need of tools. Miscellaneous machinery is less active than last month, but with a great

deal of heavy development work and factory construction planned, the outlook is excellent.

The California & Hawaiian Sugar Refining Company has plans about ready for the enlargement of its plant at Crockett, Cal., to increase the daily capacity from 900 to 1200 tons, at an estimated cost of about \$2,500,000.

The Ny Machine Works, San Francisco, has been incorporated with a capital stock of \$10,000 by D. D. Oliphant, F. Hoffman, O. L. Barry and G. Ny.

The manufacturing plant and warehouse at Second and Oak Streets, Oakland, recently purchased by the Jensen Machinery Company from the American Creamery Supply Company, were destroyed by fire Jan. 19, with an estimated loss of \$20,000.

The Yuba Construction Company, Marysville, Cal., organized ten years ago, will change its name to the Yuba Mfg. Company. The company has materially increased its investment, having recently acquired the Benicia Iron Works plant, and now plans to enlarge its shops at Marysville, which are engaged principally in the manufacture of heavy gold dredges.

Stephenson & Nichols, San Francisco, have been named northern California agents for the Terry Steam Turbine Company, Hartford, Conn.

Skinner & Hansen, Thirteenth and U streets, Sacramento, Cal., have opened a new machine shop, occupying a full city block. The plant will specialize on automobile and mining machinery repairs, and particular attention has been given to handling special steels.

Samuel C. Irving, president of the Paraffine Paint Company, Berkeley, Cal., has organized the California Asbestos Producing Company. It owns several mines in Shasta County, and has plans under way for a factory at Berkeley for the manufacture of asbestos products.

The machine shop and electric power plant of the Lagrange Mine, near Weaverville, Cal., were destroyed by fire Jan. 20, with a loss of about \$10,000.

The Wheeler Mfg. Company, Orange, Cal., has been organized to manufacture automobile wheels, springs and farm implements. Frank Wheeler is president.

The United Canneries Company, Oakland, is building a new plant, which will cover 11 acres, at an estimated cost of about \$1,000,000. A can factory building 120x300 ft. will be part of it. A. C. Harvey is president and manager, and W. H. Brown is secretary.

The Joe Fellows Yacht & Launch Company, Wilmington, Los Angeles, has filed plans for a one-story boat-building shop, 100x100 ft., on Mormon Island, to cost about \$2,700.

The Western Metals Company, Security Building, Los Angeles, is having plans prepared for an addition to its plant at Wilmington, to cost about \$4,000.

The Pacific Rubber Company, Los Angeles, has been incorporated with a capital of \$50,000, to manufacture rubber specialties. Roy R. Meads, E. G. Austin, W. H. Preston and L. S. Rounsaville, Los Angeles, and F. W. Lake, Huntington Park, are the incorporators.

The Harbor Department, Los Angeles, has filed plans for the erection of an extensive series of wharfs, transit sheds and warehouses in the Wilmington and San Pedro districts. The structures will be fully equipped with machinery for hoisting, conveying and handling materials. The terminal plant will include the following: A wharf, 20x1478 ft., Fish Harbor, \$50,000; a wharf and transit shed, slip No. 5, San Pedro, 50x670 ft., and 100x510 ft., respectively, \$119,000; a wharf and warehouse, slip No. 1, San Pedro, 32x75 ft., and 20x10 ft., respectively, \$5,000; a wharf, 45x360 ft., Wilmington Basin, \$36,000; a wharf and transit shed, San Pedro, 50x855 ft., and 100x495 ft., respectively, \$114,800; a wharf and transit shed, slip No. 1, San Pedro, 50x1200 ft. and 100x1005 ft., respectively, \$224,000; a concrete warehouse, First Street, San Pedro, six stories and basement, 152x480 ft., \$450,000.

The Crown Sash, Door & Mill Company, 2416 McPherson Street, Los Angeles, will build a one-story planing mill, 80x80 ft.

The Hanford Gas & Power Company, Hanford, Cal., plans to issue bonds for \$70,000, of which \$30,000 is to be expended for pipe and machinery for improving its system.

The Santa Fe Railroad, San Bernardino, Cal., has filed plans for a new shop and mill addition to its local car and locomotive works on Third Street, to cost \$60,000.

San Bernardino, Cal., is considering the installation of a municipal electric power plant.

The Sunset Carbon Company, Whittier, Cal., has been incorporated with a capital of \$75,000 to manufacture specialties for generators, motors, etc. Charles H. Renworthy, Whittier; Edward E. and Edwin J. Gray, Los Angeles, are the incorporators.

The Los Angeles Mercantile Marine Company, Black

Building, Los Angeles, has made application to the City Council, San Diego, for a lease of property at the foot of Talbott Street, as a site for a shipbuilding plant. The proposed plant will include machine shop, forge shop and saw mills, to be equipped with machinery to cost about \$30,000.

The Bureau of Yards & Docks, Navy Department, Washington, D. C., will receive bids up to 11 a. m. Feb. 26 for the erection of an addition to the machine shop, building No. 87, at the Mare Island Navy Yard, San Francisco, Cal.

The Pacific Northwest

PORTLAND, ORE., Feb. 6, 1917.

The pressure on the Columbia River and Puget Sound shipbuilding plants is steadily increasing; and there is a steady inquiry for both metal and wood-working machinery from them. Several new boat yards are to be equipped with machinery, and extensions of greater or less magnitude are under way or in plan for the established yards. The demand from the lumber mills has eased off a little, and the larger orders from the mines appear to have been placed. The recent advance in prices has had some effect, though the constant call for single machines and parts shows that the need for additional machinery is still acute. A considerable demand has developed from the automobile repair shops. A number of steam and hydroelectric propositions are planned for the spring and summer, but are not yet ready for figuring. Machine shops throughout the Northwest are still rushed with orders, and many plants are running night shifts to keep up with demands from the shipbuilding industry and other manufacturing interests.

An indication of the tremendous amount of shipbuilding now in progress in Portland, is a report recently compiled, showing that the deep water shipbuilding in that city alone now produces a pay roll of more than \$2,000,000 yearly. Within 60 days, when several plants now under construction will have begun operation, it is estimated the annual pay roll will amount to more than \$6,000,000.

Lumbermen are still unadvised as to the effects to be expected from the recent embargo placed upon spruce by the British Government. The move is said to have been taken to steady the market, and bring about a reduction in the price quoted, which had soared to three times the price quoted before the war.

The Albina Engine & Machine Works, Portland, Ore., is installing a new machine shop, 64x150 ft., for use in building engines for the steel ships it now has under construction. The equipment will include a 15-ton crane. A locomotive crane was set up this week, and other machinery is being installed. Another shipway is soon to be built, and plans for a new pipe shop have been completed.

The Western Boat Building Company has secured a permit for the construction of the first unit of its boat-building plant at Tacoma, Wash. Machinery will be installed for building fishing boats and cannery tenders.

The Seattle Drydock Company, Seattle, Wash., is to be reorganized by Philip D. Sloan and others as the Sloan Shipyards Corporation, with a capitalization of \$1,000,000. The headquarters of the new corporation will be in the Colman Building, Seattle. Shipbuilding works will be put in at Olympia, Wash.

Preliminary steps for equipment of the Puget Sound Navy Yard at Bremerton, Wash., as a construction station started recently when requisitions for machine tools for building work were sent to Washington, D. C. The machinery division of the station has been allotted \$250,000 for tools. This amount provides for toolmakers' lathes, turret lathes and many heavy machines.

The Harvey-Campbell Dirigible Aircraft Corporation, Spokane, Wash., has been incorporated by Carl G. Harvey, O. A. Campbell, E. A. McGoldrick, Kenneth Campbell and W. B. Riddle. It has secured a site, and it is stated the first machine is to be turned out within four months.

The International Paper Company, 30 Broad Street, New York, is reported to have recently obtained options on 100,000 acres of spruce and fir timber land in the vicinity of Reedsport, Ore.

The Willapa Harbor Iron Works, South Bend, Wash., plans to put in a branch plant at Marshfield, Ore., to handle logging equipment. A machine shop with special equipment to handle repair work will be established. N. A. Ellsworth and E. Lindsey are the owners.

Grant, Smith & Co., contractors, Henry Building, Seattle, recently secured contract for the improvements to the yards of the Great Northern Railway at Great Falls, Mont., at a cost of \$410,000. The work will include new shops, a 100,000-ton crane pit, the converting of existing shops into a blacksmith shop, and a 12-stall roundhouse, tracks, etc.

The Standard Electric Power & Chemical Company, Vancouver, Wash., has been incorporated by C. D. Charles and John A. Jeffrey, Portland, and D. P. Smith, Vancouver, to erect a plant to manufacture nitrates and other chemicals from the air. The company is capitalized at \$4,000,000, and owns water power sites on the Deschutes River, which will be developed.

The Board of Public Works, Seattle, C. B. Bagley, chairman, will open bids March 16 for equipment for the steam plant to be erected as an adjunct to the municipal lighting plant on Lake Union. The new auxiliary will double the present capacity of the plant. The machinery will cost \$300,000. Bids for the equipment will be taken on the entire installation or on the following units: (1) Boiler feed pumps and service pumps; (2) steam turbo generator, reactance coils, exciter, etc.; (3) high vacuum set condenser, air and water pumps, etc. J. D. Ross is superintendent of lighting.

The Inland Empire Pulp & Paper Company, Spokane, Wash., plans a paper mill in Aberdeen, Wash., which will cost \$1,000,000. A subsidiary company, headed by C. M. Weatherwax of the Aberdeen Lumber Shingle & Mill Company, Aberdeen, and other Aberdeen men, will be formed, to have a capitalization of \$750,000. The city has sold its water rights to Charley Creek to the company, and as soon as the site has been decided upon, the plant will be constructed. R. S. Talbot is president.

Unless the Buck Box & Crate Company, Eugene, Ore., takes over the box plant of the North Bend Company, on Coos Bay, Ore., the Eugene plant will be enlarged immediately. In the past year, the plant was able to deliver only about one-third of its orders for box shooks, wood carriers, special containers, etc.

The Portland Stove Works, Portland, Ore., plans to erect a new factory next summer but details for the structure have not been completed.

The Copper River & Northwestern Railway, Cordova, Alaska, in order to handle the increasing tonnage over its line, has placed orders for a large amount of equipment, two locomotives, etc., and also plans additions and extensions to its car shops, roundhouses and other buildings at Cordova.

Canada

TORONTO, ONT., Feb. 13, 1917.

The A. F. Byers Company, Ltd., 340 University Street, Montreal, started excavation work on a one-story concrete factory for the Thomas Davidson Mfg. Company, 187 Delisle Street, Montreal, manufacturer of sheet iron, steel ware, copper ware, etc., to cost \$80,000.

The plant of Mackinnon, Holmes & Co., Ltd., manufacturers of structural steel, penstocks, etc., Sherbrooke, Que., was damaged by fire Feb. 8, with an estimated loss of \$30,000.

British Forgings, Ltd., Toronto, has received permit for an electric steel plant at the foot of Cherry Street, Toronto, to cost \$175,000. Construction work will be started immediately.

Anglins, Ltd., 65 Victoria Street, Montreal, has been awarded contract for a shipbuilding berth for the Canadian Vickers Company, Montreal.

The name of the firm of Heap & Partners, Ltd., Montreal, has been changed to Samuel Osborne & Co. The company has secured a factory on Seigneurs Street, Montreal, and has equipped it with machinery for the manufacture of high-speed tool steel. S. C. Burk is superintendent.

The Eau Claire Waterworks Company, Tecumseh, Ont., will receive tenders until March 1 for two centrifugal pumps and motors, to cost \$20,000. R. W. Code, Board of Trade Building, Windsor, Ont., is the engineer.

John A. Moody, London, Ont., is in the market for a marine boiler and engine from 200 to 300 hp.

The ratepayers of Oakville, Ont., granted concessions to the Acme Tire & Rubber Company, which in return will establish a plant there for the manufacture of rubber tires and goods.

The ratepayers of Grimsby, Ont., granted a loan of \$6,000 to the Metal Craft Company, which will erect a plant there.

Wolesley, Sask., proposes to make extensions to its light and power plant to cost \$10,000.

The City Council, St. John, N. B., proposes to purchase a 50-hp. stationary engine for its asphalt plant. G. F. Fisher is commissioner.

The Mack Brick Company, Montreal, recently incorporated, will start work next spring on a brick plant at Montreal. T. W. McArthur, 84 Curzon Avenue, Montreal West, is manager.

The Delta Copper Company, 703 Tegler Block, Edmonton, Alberta, later on will construct an aerial railway 3½

miles long, and will also build a power plant at Skeena Crossing, B. C.

A. C. Eisenbach, care of Gordon Philip, City Hall, London, Ont., is said to be making arrangements for erecting an automobile factory at London, to cost \$50,000.

The General Machinery & Equipment Company, Ltd., Vancouver, B. C., has opened offices in the Birks Building, that city. The firm will handle a general line of contractors' and mining equipment, also railway supplies. John MacKenzie is managing director of the company.

John Coughlan & Sons will build a two-story machine shop at Front and Columbia Streets, Vancouver, B. C., to cost \$10,000.

W. G. Edge, Ltd., Ottawa, has been incorporated with a capital stock of \$100,000 by William G. Edge, John Smith, James F. Cunningham and others to manufacture plumbers' supplies, etc.

The Union Special Machine Company of Canada, Ltd., Toronto, has been incorporated with a capital stock of \$25,000 by James S. Lovell, 25 King Street West; Charles D. Magee, 300 St. George Street; William Bain and others.

Joseph M. Tobin, Halifax, N. S., is organizing a shipbuilding company to have a capital stock of \$2,000,000, under the style of the Nova Scotia Shipbuilding Company, Halifax.

It is reported that the Dominion Government proposes to make improvements to the port of Halifax, and to build a shipbuilding plant there to cost \$30,000,000.

The plant of the Chapman Engine Works, Dundas, Ont., was damaged by fire Feb. 5, with a loss of \$15,000.

The foundry and machine shop of the E. Long Mfg. Company, Gravenhurst, Ont., was destroyed by fire Feb. 6, with a loss of \$20,000.

Smith Brothers, Ltd., Beachville, Ont., has been incorporated with a capital stock of \$20,000 by Arthur W. Smith and others, all of West Oxford, Ont., to manufacture fly traps, etc.

P. W. Ellis & Co., Ltd., Wellington Street, Toronto, has been authorized to manufacture munitions.

The Carter Welding Company of Toronto, Ltd., Toronto, has been incorporated with a capital stock of \$40,000 by Herbert W. Carter, 944 Dufferin Street; Peter M. Sorley, Frank S. Mearns and others.

The Victoria Toy Mfg. Company, Ltd., Victoriaville, Que., has been incorporated with a capital stock of \$49,000 by J. E. Alain, O. A. Thibault, C. Tourigny and others, to manufacture metal toys, etc.

Government Purchases

WASHINGTON, D. C., Feb. 13, 1917.

The chief of the Bureau of Yards and Docks, Navy Department, Washington, will receive sealed proposals until 11 a. m. Feb. 26 for furnishing one 1000-kw. direct current turbo generator for Portsmouth, and one 1000-kw. turbo alternating current generator at Charleston; until 11 a. m. March 19 for furnishing an alternating current generator in connection with engine furnished by the Government, boilers, condensers, pumps, motors, etc., for a power plant at the Naval Torpedo Station, Puget Sound.

The commanding officer at Rock Island Arsenal, Ill., will receive sealed proposals until Feb. 28, under circular 1042, for furnishing four hydraulic turbine units complete and for additional ring curbs for future units.

The United States Civil Service Commission announces competitive examinations for a designing mechanical engineer, \$2,100 per year, for the Board of Engineers, United States Army, New York; a metallurgist, salary ranging from \$2,400 to \$3,300 per year, for service in the field under the Bureau of Mines, Department of the Interior; mechanical draftsmen, with salaries at \$125 or \$150 per month, for duty in the Panama Canal Service; for a vacancy in the position of technical assistant to the National Advisory Committee for Aeronautics at \$2,000 per year, and a chief petroleum technologist at \$4,800 per year for the Bureau of Mines, for service in Washington, D. C. Forms may be obtained from the Civil Service Commission, Washington, D. C., or from the Civil Service Board in the post offices of the larger cities.

The Alaska Engineering Commission, in charge of C. E. Dole, with headquarters in Seattle, Wash., has opened a branch office in Portland, Ore., which will be in charge of Joseph J. Hittinger.

Judicial Decisions

ABSTRACTED BY A. L. H. STREET

EMPLOYER'S LIABILITY FOR ACCIDENT TO EMPLOYEE.

—Defendant, an owner of a machine shop, contracted for the purchase of a welding machine on condition that the seller furnish an expert to teach defendant's foreman how to operate it. While the expert and the foreman were so in control of the machine, they permitted coal oil in some way to come in contact with chemicals used in generating oxygen gas, thereby producing a high explosive, which, on being placed in the retort of the welding machine, resulted in an explosion that proved fatal to both of them. Held, in an action for death of the foreman, that defendant was not liable, the work having been under the exclusive control of the deceased men, and it not appearing that defendant was negligent in any respect. (North Carolina Supreme Court, Orr vs. Rumbough, 90 Southeastern Reporter, 911.)

SALES OF MACHINERY TO MINORS.—A minor who has bought a machine for use in a business enterprise established by him is entitled to disaffirm the purchase on arriving at his majority, return the property, and recover what he paid for the machine, less the amount of benefits derived from the use of the machine, if the contract of sale was fair and reasonable, and not improvident, considering the extent of his assets. But if a minor's contract was manifestly unfair to him and improvident, he is entitled to rescind without reimbursing the seller for use of the property or any deterioration in its value. (Minnesota Supreme Court, Berglund vs. American Multigraph Sales Company, 160 Northwestern Reporter, 191.)

SELLER'S REMEDY AGAINST DEFAULTING BUYER.

When the seller under a contract for the sale of goods has completed his part of the bargain by tendering delivery to the buyer under bill of lading attached to draft on the buyer, but the latter has refused to accept delivery by paying the draft, the seller may resell the goods, as a basis for holding the buyer liable for the excess of the contract price above the amount derived from the resale. But before the buyer can be bound in this way, he is entitled to reasonable notice of the seller's intention to make the resale. The buyer is not entitled to rely upon an agreement with the seller's agent as showing a waiver of the seller's claim against the buyer, in the absence of proof that the agent was authorized to make the agreement. Nor will the buyer's mere promise to pay demurrage charges against the rejected shipment constitute a sufficient legal consideration for such waiver, the buyer being already legally bound to pay such charges on account of their accrual through his default. (Alabama Court of Appeals, Southern States Company vs. Long, 73 Southern Reporter, 148.)

HEART ATTACK AS "ACCIDENT" UNDER COMPENSATION ACTS.—A foundry night watchman died of an "accident" sustained in the course of his employment where he was stricken by a heart attack through excitement aroused in discovering a fire, giving an alarm, and attempting to extinguish the blaze. Michigan Supreme Court, Schroetke vs. Jackson-Church Company, 160 Northwestern Reporter, 383.)

LAWFUL AND UNLAWFUL MEANS OF COMPETITION.

Since the law looks with favor on competition, methods adopted by one manufacturer to divert business to himself from a competitor will not be relieved against unless they fall within the legal doctrine of "unfair competition," or unless the particular goods are protected by patent or copyright. "Unfair competition" consists in practices which tend to deceive the public into believing that particular goods were produced by one other than the actual producer, as by simulating marks or names, issuing misleading advertisements, making misleading oral statements to prospective customers, etc. But no unfair competition is shown in the mere fact of a member withdrawing from an established firm and taking some of its employees to establish a competing enterprise. Courts are reluctant to deprive

manufacturers of the right to use their own personal names in business names, and unless a complaining manufacturer shows that a competitor has adopted a name so nearly like that previously used by the former as to tend to deceive the public as to the origin of competing goods, there is no legal remedy. That one widely known as an expert in the mechanic arts withdrew from a company bearing his name does not prevent him from establishing a competing enterprise bearing the same name, if the respective names of the two enterprises and their products are so distinguishable as to prevent confusion in the public mind. There is no "unfair competition" in the act of a member of a firm, on withdrawing from it, to advertise his withdrawal and organization of a new firm to make similar articles of manufacture. (Maine Supreme Judicial Court, Lapointe Machine Tool Company vs. J. N. Lapointe Company, 99 Atlantic Reporter, 348.)

TITLE TO APPARATUS IN PROCESS OF INSTALLATION.

The buyer of apparatus to be specially manufactured and installed by the seller has no such title to parts on his premises in the process of installation as gives his creditor any right to attach them, in the absence of proof that it was intended that title should pass before completion of installation. (West Virginia Supreme Court of Appeals, R. H. Thomas Company vs. Lewis, Hubbard & Co., 90 Southeastern Reporter, 816.)

TIME FOR INSTALLING APPLIANCES UNDER CONTRACT.

—When a contract for installation of apparatus for a buyer does not specify the time within which the agreement is to be performed, the seller is entitled to a reasonable time, considering all the surrounding circumstances. If the contract be in writing, containing a clause that agreements concerning the sale are not to be valid unless incorporated into the written contract, the buyer cannot rely upon an oral statement by the seller's agent that installation will be made within a certain time, less than a reasonable time. But even where the buyer is entitled to rely upon a salesman's oral representation as to the time within which equipment will be installed, he waives the time limit by permitting installation to be commenced at a later date. Where a contract for installation of automatic sprinklers in a factory did not specify a time for installation, the seller was not liable for a fire which consumed the premises while the apparatus was being installed three months after the order for installation was received, he being in no way responsible for the fire. (California Supreme Court, Brookings Lumber & Box Company vs. Manufacturers' Automatic Sprinkler Company, 161 Pacific Reporter, 266.)

PHASES OF SALES CONTRACTS.—When an agreement for a sale of goods entitles the purchaser to return the goods if after thorough trial for 30 days they prove to be unsatisfactory, his retention of them after the expiration of that period, without giving the seller any notice of dissatisfaction, forfeits the buyer's right to reject or return the goods, even though no thorough trial may have been made within that time. Notice of rejection of goods bought from a corporation must be given to some representative of the company authorized, or apparently authorized, to receive it. After expiration of such trial period, the buyer will not be permitted to defend suit brought for the purchase price on the ground that the goods were actually worthless. (Alabama Supreme Court, Manchester Sawmills Company vs. A. L. Arundel Company, 73 Southern Reporter, 24.)

PLACE FOR DELIVERY OF GOODS SOLD.—Unless there is an agreement expressly to the contrary, or circumstances indicating a different intention, it will be presumed that the parties to a contract for sale of goods to be shipped to the buyer intended that title should pass to him on proper shipment being made by the seller, entitling the latter to recover the agreed price notwithstanding loss of the goods in transit. The buyer's right of inspection, to ascertain whether the goods delivered are in fact such as were purchased, does not change the rule above stated. (Indiana Appellate Court, Robbins vs. Brazil Syndicate R. & B. Company, 114 Northeastern Reporter, 707.)

NEW TRADE PUBLICATIONS

Calendar.—Worthington Pump & Machinery Corporation, 115 Broadway, New York City. Calendar hanger measuring 14 x 20½ in. The upper half of each leaf is given over to lists and engravings of the various plants and the principal products, which include air compressors, pumps of all kinds, internal combustion engines, condensers, mining machinery, etc., and in some cases views of actual installations. A list of the branch houses is also given on each leaf. The calendar for each month occupies the remaining portion of the leaf and gives the dates for three months.

Taps and Dies.—Greenfield Tap & Die Corporation, Greenfield, Mass. Bulletin No. 1 entitled, "How to Measure Screw Threads." Is the first of a series of treatises on threading and gaging problems and refers to the right and wrong ways of gaging tapped holes and screws. The necessity of using gages is pointed out and a number of views of the gages in use are included. A summary of the standardized methods recommended is presented and tables of proposed limits for tapped holes are included.

Motor Trucks.—International Motor Company, Sixty-fourth Street and West End Avenue, New York City. Pamphlet. Devoted to the transportation by motor truck of the 10-ton base of a telescope to the observatory at the top of Mount Wilson. A number of engravings showing the 3½-ton truck used to transport the base at various points on the trail supplements a complete description of the feat.

Drilling Heads.—Sellew Machine Tool Company, Pawtucket. Three leaflets. Give general descriptions and specifications for a line of heads for use on drilling machines where it is desired to drill or tap more holes than is possible with the regular machine equipment. Three types of heads are shown, a cluster adjustable, which, as the name indicates, enables a variety of holes to be drilled on various center distances in any direction, a straight-line adjustable where the drill spindles can be varied in one vertical plane only and an inclosed double auxiliary type which has three spindles arranged in the same vertical plane. Illustrations of all of the heads are presented.

Wrought Pipe.—National Tube Company, Pittsburgh. Appendix to 1913 Book of Standards. Illustrates and describes the tubular goods of this company and contains numerous tables and useful information regarding them. A list of the products is presented, followed by another one giving some of the uses of National pipe. A bibliography on the corrosion of iron and steel is included, together with a number of tables of weights, dimensions and other useful data. References to the pages in the 1913 edition which are superseded or supplemented are given throughout the appendix. A list of publications and a complete index to the appendix and the main Book of Standards are included.

Electrical Specialties.—Clemens Electrical Corporation, 725 Main Street, Buffalo. Collection of circulars. Treat of a line of refillable fuse plugs and electric soldering tools. An illustration of the plug is presented, with instructions for reloading. An engraving and list of the various types of soldering iron that can be furnished for either storage battery or alternating current is included.

Tractors.—La Crosse Tractor Company, 1203 Hennepin Avenue, Minneapolis. Folder. Describes and illustrates a line of tractors employing kerosene or distillate as fuel. The smaller unit develops from 8 to 16 hp., while the larger one develops from 12 to 24 hp. A number of views of the tractor and its parts are presented and a condensed set of specifications for the two sizes built is included.

Adjustable Reamers.—Gisholt Machine Company, Madison, Wis. Circular. Pertains to a line of solid adjustable reamers employing high-speed steel blades that are readily renewed. The advantages claimed for these reamers, of increased production at a reduced cost, simplicity and strength of construction and ease of adjustment are briefly touched upon. Engravings of some of the various styles that can be furnished are presented, together with a cross-sectional drawing. A partial list of users and dimension tables are included.

Countershafts.—St. Louis Machine Tool Company, St. Louis. Circular. Points out the advantages of a line of countershafts of the self-contained and pull types. A condensed table of specifications for the six sizes which can be supplied in all three types is included.

Twist Drills and Reamers.—Celfor Tool Company, Buchanan, Mich., Clark Equipment Company, successor. Catalog No. 15 superseding all previous issues. Lists and describes briefly a line of standard tools, including high-speed twist drills, reamers, countersinks, flue cutters and

lathe tools. Each type of tool is given a separate page with an illustration and a list of the sizes that can be supplied with dimensions and prices. The drills covered include the flat twist with beaded, taper and round shanks and concave twist with round or tapered shanks. Mention is made of a line of chucks and extension sockets, and a table of decimal equivalents and a complete index are included.

Bronze Alloys.—Lumen Bearing Company, Buffalo. Booklet. Points out the advantages of using bronze alloys prepared to specifications for making castings. The various grades made are listed with brief specification tables and information as to the service for which they are recommended. Views of castings produced with the different alloys are included in a number of cases, and mention is made of the line of die castings produced.

Automatic Fire Alarm.—New York Brass Foundry Company, 102 Centre Street, New York City. Folder. Illustrations and descriptive matter explain the operation of an automatic fire alarm and detector which can be installed in factories, shops, mills, warehouses, piers, etc., to give an alarm of fire before serious trouble occurs. The device is intended for installation in any number required to protect a given area and is operated by dry cells.

Shop Furniture.—New Britain Machine Company, New Britain, Conn. Three bulletins. The first, No. 1200-A, mentions a line of pressed steel bench legs which are made in a variety of sizes and styles and shows how they are used. The other two bulletins, Nos. 1224 and 1224-B, describe nesting and stacking tote boxes of one-piece construction, which were illustrated in THE IRON AGE, April 13 and Oct. 26, 1916, respectively. Views of single boxes and of stacks and nests are presented and supplement the text description. Condensed tables of specifications for both styles of boxes are included.

Automatic Plate Valves.—Mesta Machine Company, Pittsburgh. Bulletin D. Illustrates an automatic plate valve made under the Iversen patent for air, gas and ammonia compressors; vacuum pumps and blowing engines. The construction of the valve is gone into at some length and a number of illustrations of the valves themselves, the cages used in remodeling blowing engine air heads and curves of test results are included. An illustrated description of this valve appeared in THE IRON AGE, May 29, 1913.

Power Hammers.—Beaudry & Co., Inc., 141 Milk Street, Boston. Pamphlet. Shows a line of power hammers designed for either belt or motor drive which are built with rams ranging from 25 to 500 lb. Illustrations of the two styles of hammer built are presented, together with a condensed table of specifications.

Swedish Electric Pig Iron and Steel

The Swedish output of pig iron and steel from electric furnaces in 1915 is given as follows in recent official data:

	Metric tons
Pig iron	35,075
Silicon steel	11,819
Silico-manganese steel	2,328
Manganese steel	947
Chrome steel	242
Silico-manganese-aluminum steel	785
Silico-aluminum steel	346
Vanadium steel	4

At the beginning of 1914, there were five electric furnaces producing pig iron, with three more in contemplation. Each had a power of 2000 to 3000 kw. In 1915 there were 10 electric furnaces producing steel.

Toy operating models of machinery and devices are recommended by Simon Rosen & Son, agents, Vladivostok, as the proper method of securing business for such goods in Russia and Siberia. Buyers in these countries are not accustomed to purchase from illustration and printed description in any language. German manufacturers have long ago adopted this method, and although models were frequently expensive, they were able in this way, they say, to close contracts which could not otherwise be secured.

The First National Bank of Boston has completed arrangements for opening a branch at Buenos Aires, Argentina. It will be in charge of Noel F. Tribe, who has resided in Argentina for the past 20 years and is versed in South American financial and trade conditions. He will leave for his new post at the end of the present month.

H

U

inc
mo
po
20
of
ma
sh
60
ser
pe

gr
are
of
ac
ec
ing
of
du
inc
it
it

ish
pat
on
tak
ene

its
we
a.
the
the
rec
tes
wo
con
wo

rea
of
blo

was
san
ing
thu
of
the
six
or
was
two